

981

EX BIBLIOTHECA



CAR. I. TABORIS.

X21631



22102107956

Med

K33803

ON
A P H A S I A,

OR
Loss of Speech,

AND
THE LOCALISATION OF THE FACULTY OF ARTICULATE
LANGUAGE.

Dr Hughlings Jackson, F.R.S
with the Authors Kind regards.

ON
APHASIA,

OR
Loss of Speech,

AND
THE LOCALISATION OF THE FACULTY OF ARTICULATE
LANGUAGE.

BY
FREDERIC BATEMAN, M.D.,

*Fellow of the Royal College of Physicians.
Senior Physician to the Norfolk and Norwich Hospital;
Corresponding Member of the Academy of Medicine of Paris, and of the
Psychiatrical Society of St. Petersburg;
Hon. Member of the New York Neurological Society;
Foreign Associate of the Medico-Psychological Society of Paris;
Hon. Physician to the Norwich Asylum; Visiting Physician to the Bethel Hospital;
Consulting Physician to the Lind Infirmary for Children,
the Norwich Eye Infirmary,
and the Eastern Counties' Asylum for Idiots. .*

SECOND EDITION, GREATLY ENLARGED.


LONDON:
J. & A. CHURCHILL;
JARROLD AND SONS, 3, PATERNOSTER BUILDINGS.

[1880]



WELLCOME INSTITUTE LIBRARY	
Coll.	welMOMec
Call No.	
	WL

P R E F A C E .



PERHAPS there is no subject in the whole range of neuro-pathology that has engrossed so large a share of the attention, not only of the medical profession, but of scientific men generally, in all parts of the world, as the Localisation of Speech, and the causes which interfere with the outward manifestation of that faculty.

My first edition, published just twenty years ago, was one of the earliest, if not the very first treatise on Aphasia that appeared in this country ; and the favourable reception accorded to it both at home and abroad, might justly have encouraged me to issue a second edition long ago. I was deterred, however, from a hasty reproduction of the work, by the great diversity of opinion prevalent upon the points at issue, and I have preferred to wait till the horizon of scientific controversy was somewhat cleared, and the tangled skein of medical psychology partly unravelled.

In the arrangement of my subject, I have followed very much the plan of the first edition, beginning with a condensed bibliographical sketch of the contributions of British, American, and continental writers. As the literature of aphasia has become so immensely enriched

PREFACE.

during the last twenty years, it may possibly be thought that a Bibliography was an anachronism; I have, however, decided to retain that portion of the work, as I have reason to believe that it has been useful to other writers, more especially as many of the cases referred to, are contained in works not easily accessible to the majority of my readers.

The present edition is not merely a reprint of the old one, with a few casual alterations; I have endeavoured to bring the work up to the present state of our knowledge of the subject of which it treats, and I have added so much new matter as to constitute it rather a new work than a revised edition of a former one. Amongst the fresh matter added, I may refer to the chapter on the Jurisprudence of Aphasia, a subject of paramount importance to the medical jurist, and which, as far as I know, has not been treated by any British writer. In the concluding chapter certain collateral subjects, only indirectly connected with the localisation of speech, are considered, such as the Minute Anatomy, the Histology, and the Chemistry of the Brain.

One word as to the title of the book. As I have treated of all disorders of the expression and of the comprehension of the signs by which man can express his thought, I might, perhaps, have selected a more comprehensive term than that which I have adopted; rather, however, than invent a new word, I prefer to retain the word Aphasia, subject to the above explanation.

When I first wrote upon this subject twenty years ago, the question of the localisation of cerebral function was

PREFACE.

in its infancy, and our knowledge of the actual pathological changes occurring in nerve tissue were vague and unsatisfactory. Although an immense stride has been made during the last few years in neuro-pathology, we seem still to be to some extent on the threshold of the inquiry ; and the difference of opinion between the most eminent authorities upon the points in dispute is so great, that much is still to be learnt, before we can speak with anything like mathematical precision, of certain functions of that wonderful piece of mechanism—the human brain. Indeed, when I consider the large amount of research that has been expended upon this subject, and contrast it with the precise knowledge that we possess, I am inclined to say with Goethe:—

*Das Wenige verschwindet leicht dem Blicke,
Der vorwärts sieht, wie viel noch übrig bleibt.*

In the preparation of this treatise, I have been much indebted to the kind co-operation of other labourers in the same department of science, both at home and abroad ; and amongst those to whom my especial acknowledgments are due, I may mention Drs. Gowers, Bastian, and de Watteville of London ; Professors Struthers and Hamilton, of Aberdeen ; Professors Ball of Paris, Goltz of Strassburg, and Benedikt of Vienna.

FREDERIC BATEMAN.

Norwich, May, 1890.

CONTENTS.

CHAPTER I.

PAGE

Definition. Bibliography—Hippocrates; Sauvages. Description of the disposition and arrangement of the cerebral convolutions. Writers of the French school—Bouillaud; Andral; Drs. M. and G. Dax; Professor Broca, his *ne plus ultra* of pathological topography, summary of his two primitive and typical cases; classification of Jules Falret; clinical lectures of Professor Trousseau. The celebrated discussion on the localisation of the faculty of speech, at the Academy of Medicine of Paris; M. Bouillaud's challenge; the test case of M. Velpeau; divers observations from the French press. Ladame's statistics of lesions of speech in connection with tumours of the brain. Description of Professor Charcot's diagram of the mechanism of articulate and written language - 13

CHAPTER II.

Bibliography continued. Schröder van der Kolk—his theory of the connection of speech with the olivary bodies, which he regarded as auxiliary ganglia to the hypoglossus nerve; his argument from Comparative Anatomy; a case in support of his views; testimony of Cruveilhier. German writers—Romberg; Bergmann; Hasbach; Von Benedikt and Braunwart; Kussmaul - - - 42

CHAPTER III.

Bibliography continued. English, Scotch, and Irish writers—discussion at the annual meeting of the British Medical Association at Dublin, in 1867; aphasia occurring as a complication of cerebro-spinal arachnitis. American contributions to the literature of aphasia—S. Jackson, Hun, Bigelow; Wilbur on defects of speech in idiots; Austin Flint; Seguin, his statistics of the parts of the encephalon damaged in 556 cases of aphasia; Hammond, his views on the question of the localisation of speech; divers communications to the American journals - - - - -

52

CHAPTER IV.

Author's own clinical experience—Volumetric analysis of the urine in cerebral disease. Aphasia of the ataxic form occurring as the earliest indication of disease; curious chain of morbid symptoms, eventually merging into general paralysis; critical analysis of the clinical history; autopsy; question of the testamentary capacity of the patient. Three cases of aphasia in which the autopsy revealed a healthy condition of the frontal convolutions; importance of examining the condition of the bones of the cranium in aphasia, as illustrated by these cases. Loss of speech with paraplegia; spinal symptoms. Aphasia as a climacteric symptom. Loss of speech with left hemiplegia; extensive cardiac disease, frontal convolutions healthy, fibrinous blocks in the spleen. Loss of speech, preceded by numbness of the tongue; lingual spasm, eventually ending in bulbar paralysis. Case of puerperal aphasia; lacteal derangement, galactorrhæa from vaso-motor paralysis.

Intermittent aphasia; epileptic logoneurosis; peculiar form of aura; the epileptogenous zone being always in the neighbourhood of the cervical sympathetic; complete suspension of articulate language for six weeks, without any motor paralysis, and with the general faculty of language unimpaired; patient

able to communicate with others by writing, and also by dactylogy. Good effects of electricity; critical analysis of the exceptional symptoms manifested by this patient. Inquiry as to what part of the complicated mechanism of speech the psychical condition could be pathogenetically referred. Views of Gowers, Trousseau, Kussmaul, and Ball on similar cases. Spasmodic ischæmia - - - - 98

CHAPTER V.

Synonyms. Definition of aphasia. What is Speech? Analysis of the faculty of Language—Max Muller; Kussmaul; Whitney; Ross; Cerise; Parchappe. Speech is a physico-psychical act; consists of two distinct elements, one somatic—a movement, the other psychical, the interior speech—the *λογος*; the impressive or ingoing, and the expressive or outgoing functions of language. Articulate Language is a Universal attribute of Man—testimony of Dr. Moffatt, Sir Bartle Frere, and Sir Samuel Baker; the *homo mutus* of Lord Monboddo.

The organs of voice, the acoustics of speech, and the mechanism of articulation; the larynx a musical instrument of extraordinary perfection; the tongue not essential to speech. Articulate language must not be confounded with the General faculty of language. On the language of Nature in contradistinction to acquired or artificial language or Speech—the Natural language of the Voice, of the Physiognomy, and of Gesture; illustrations from Euripides, Cicero, Shakespeare, and Corneille.

Eulogy of gesture-language by Vossius, who preferred it to articulate speech; serves as the habitual means of communication with the Cistercian and Carthusian monks; illustrations of the advantage of this form of language, from Lucian, Ælianus and Macrobius. The transition from natural to artificial language exemplified. Speech an acquired reflex. Kussmaul's comparison of the speech mechanism to a telegraphic apparatus. 149

CHAPTER VI.

Classification. Discussion at the British Association at Norwich in 1868. Professor Charcot on the passive and active phases of the faculty of language. Dr. Bastian on the auditory, visual, and kinæsthetic memories. Varieties—Aphasia may be complete or partial, permanent or intermittent. Is sometimes limited to substances; sometimes to proper names—Thucydides, Pliny, Vauvenargues. Baron Larrey's celebrated case of gun-shot wound. The defect may be limited to a particular language; on one occasion a knowledge of Greek only was lost. Languages revived during delirium.

Recurring utterances, stereotyped phrases from "fossilisation" of impressions. May be the sole morbid symptom—Professor Rostan's personal experience; typical case observed by the author. Heterophasia or Paraphasia—the inability to connect word-images with their corresponding conceptions. The *Spectator* on perversion of speech, with an analysis of the author's first edition. Can thought exist without word-images? A case of verbal delirium. Agraphia, or loss of the faculty of written language—a defect in the cheiro-kinæsthetic centre; is not a material but a psychical inability to write.

On Mirror-writing (Spiegelschrift), or the reversal of the normal position of the letters; Βουστροφύδον mode of writing. Greek Epigraphy—Welsford, Roberts. Paramimia, or the perversion of pantomimic language; remarkable echo case observed by the author at La Salpêtrière—a human parrot: an acoustic reflex. The language of Physiognomy. - -

178

CHAPTER VII.

Varieties of aphasia continued. Sensory Aphasia—the impressive or centripetal function essentially impaired. The psychology of hearing, and the cerebral operations that follow impressions on the ear. Word-deafness—a purely psychical,

and not an auditory defect ; may be confounded with insanity. The perception of musical sounds may be abolished as well as that of articulate language—Grant Allen on Note-deafness.

On verbal amnesia. The psychology of sight, and the cerebral operations that follow impressions on the eye. Word-blindness—a psychical and not a visual defect ; illustrations from Charcot and Ross. Pathology of Word-deafness and Word-blindness. The auditory and visual centres in the brain ; experiments on animals by Ferrier, Schäfer and Sanger Brown ; their conflicting results. Hemianopsia—Gowers on the higher visual centre ; Chaffard, Pflüger, Skworzoff, and de Watteville. Intermittent Aphasia—functional cerebral ischæmia. Automatic utterances under emotion—the interjectional expressions of aphasics. Hysterical mutism—essentially of a dynamic nature ; can be produced artificially by hypnotism. - -

CHAPTER VIII.

Etiology of Aphasia—May be congenital. Deaf-mutism—Kussmaul's statistics as to sex, locality, &c. ; the dumbness not due to the absence of the faculty of speech, but to its want of development. The loquelar defect in Idiots—Esquirol's classification of idiocy ; Kerlin's statistics ; the aphasia of the idiot not to be confounded with deaf-mutism ; intemperance of the parents as a factor in idiocy ; the tardy development of speech from intra-cranial lesion. Aphasia may be the result of exostosis of the cranial bones ; of thrombus of the cerebral arteries ; of ischæmic softening ; of tumours or abscess in the brain, &c. Huguenin on loss of speech in tuberculous meningitis. Macewen on the Surgery of the Brain. Gowers on irritative inhibition. Traumatic Aphasia caused by direct injury to the brain—Baron Larrey, Simon, &c. ; three cases observed by the author. The rôle of the sympathetic system in the production of aphasia by vaso-motor paralysis. Loss of speech may occur as a remote symptom of endopericarditis, of spinal

disease, and also as the result of emotional excitement. Neurokinesis. May be caused by atmospheric changes; by reflex action; by the bite of venomous snakes; by the action of certain drugs; by the excessive use of tobacco; by simple molecular disturbance of the brain cells. Hephæstic hemiplegia. Puerperal aphasia—cerebral ischæmia. - -

245

CHAPTER IX.

Diagnosis—Aphonia; whispering is in reality an articulate language. Labio-glosso-pharyngeal paralysis. The speechlessness of lunatics. Importance of the quantitative analysis of the urine—uræmic poisoning, renal inadequacy. The Sphygmograph and the Ophthalmoscope. Thermometric observation and its value in cerebral pathology; thermic exploration of the different cranial regions—Broca, Voisin, Lombard, and Maragliani. Auscultation of the parietes of the cranium.

Prognosis—more favourable in traumatic cases, and when uncomplicated with any paralytic symptom. Professor Benedikt's case of tardy development of speech in congenital aphasia. Recovery of speech after suspension of the faculty for twenty years.

Treatment—must depend upon the cause which produces it. Electricity; its indiscriminate use to be deprecated; views of Todd, Marcet, and Radcliffe. Influence of sudden mental shock in rousing the dormant faculty of articulate language—Herodotus, Wiedemeister, Ireland. Trephining in traumatic aphasia; report of three successful cases at the Royal Academy of Medicine of Ireland. On the re-education of the nervous centres - - - - -

279

CHAPTER X.

On the Jurisprudence of Aphasia—French and German writers on the subject; not hitherto treated by any British author. Loss of Speech may affect both civil and criminal responsibility. The testamentary capacity of aphasics—a

speechless Mayor ; the validity of wills made by the deaf and dumb ; probate granted of the will of a deaf and dumb testator, whose wife was also a deaf-mute, and who, with other deaf and dumb witnesses, gave evidence at the trial. Remarkable case

a testator disposing of a large fortune by means of gesture language ; probate of the will being refused solely on the ground of a slight technical formality.

On the capacity of speechless persons to manage their affairs generally ; important case submitted to the Medico-Legal Society of Paris. The "interdiction" of the French code. The medico-legal aspect of the author's own cases recorded in this treatise, in which the symptoms were due to injury of the *expressive* mechanism of speech. Word-blindness and Word-deafness, being disorders of the *impressive* mechanism of speech, may throw doubts upon testamentary capacity, and the study of this form of Sensory Aphasia is of capital importance to the medical jurist.

Inability to speak will not absolve a person from civil and criminal responsibility, and deaf-mutes are held responsible for their acts ; a marriage in which the bridegroom, bride, and bridesmaids were all deaf-mutes, the ceremony being performed in the deaf and dumb alphabet. A cause decided solely on the evidence of three dumb witnesses. Articulate language is not the only medium of thought and of expression ;—the outward sign may be verbal, vocal, graphic, or mimic. A presidential address delivered entirely in gesture language. Aphasia does not necessarily entail testamentary incompetency, or inability to discharge civil or social functions. - -

CHAPTER XI.

Summary—The Psychology of the ancients ; their crude notions of the functions of the brain ; Hippocrates, Aristotle, Servetus, Lapeyronie, Willis, and Huarte. The different theories as to the seat of speech ; Gall, the pioneer of cerebral

localisation; his system of Phrenology based on the external prominences of the skull—cranoscopy; the value of his researches. The connection between Matter and Mind. A faculty should not be confounded with the corporeal organ upon which its external manifestation depends. The various theories of the localisation of the faculty of articulate language considered, and weighed by the evidence contained in the preceding chapters. Dr. Allen Starr on diseases of the Pons. The brain not the sole organ of the mind.

On Hypnotism—its two stages; desirability of studying hypnotic phenomena; views of Ballet, Bernheim, and Hack Tuke; the Salpêtrière experiments and their bearing on the speech question. The decussation of the optic fibres—Grasset, Michael Foster; views of Hamilton, Ross, and Gowers as to their ultimate course. Views of non-medical writers as to the seat of speech—H. Spenser, G. J. Romanes. Discussion on cerebral localisation at the Washington Medical Congress. The brain compared to a violin. Brown-Séquard on Inhibition as a factor in aphasia. - - - -

315

CHAPTER XII.

Consideration of certain collateral subjects indirectly connected with the Localisation of Speech. The minute Anatomy of the brain. The symmetry of the two hemispheres; views of Todd and Broca; statistics of Lebon. Craniological studies on the skulls of lunatics. Cerebral asymmetry and its relation to criminality; the reduplication of the second frontal convolution said to be common in murderers—a statement supported by Benedikt and Bouchard.

The science of Criminal Anthropology—its literature; Enrico Ferri on the factors of crime. Professor Lombroso's description of the habitual homicide; Manouvrier on the presence of the metopic suture; his researches in the Paris catacombs. Gradenigo on the hearing of criminals; Osler on criminal automata. On psychical anæsthesia; the peculiar phraseology

of the Criminal Anthropologists. The comparative weight of the two hemispheres—statistics of Boyd, Luys, and others.

The brain from an anthropological point of view ; weight of the brains of eminent men. Minute structure of the cerebral convolutions. Mierzejewski on the brains of Idiots. Broadbent's researches on the peculiar structure of the third frontal convolution ; great development of this gyrus said to exist in orators ; description of the brain of Gambetta. The Paris society for mutual autopsy.

Physiology—considerations on left-handed aphasics ; a left-handed family. Ligature of the left common carotid, and its effect on speech. On dextral pre-eminence ; why is the human race right-handed ? Views of Bichat and Ferrier. Aristotle on the preferential use of the right limbs in animals ; dextral pre-eminence observed in monkeys ; the left-handedness of the ancient Hebrews. Embryology—Gratiolet's theory of the early development of the frontal convolutions, denied by Carl Vogt.

Comparative Anatomy—Is language the exclusive prerogative of man ? Leconte and Waterhouse on the gesture language of the ape tribe. The emotional language of certain animals. The mimicry of the parrot merely an acoustic reflex. Articulate speech furnishes the difference of kind between man and animals which Darwin asserted did not exist. Physiological homologies between the brain of man and that of the ape. Carl Vogt on the comparative development of the third frontal convolution in man and in the ape—why man speaks and the ape does not. The frontal convolutions of the microcephali. The island of Reil an important characteristic of the human brain.

Experimental Pathology—Bouillaud's experiments on the brain of animals. Researches of Hitzig, Ferrier, and Duret. Goltz on the croaking of the frog. On the affinities and differences between the brain of man and that of animals—the bridging convolutions ; the hippocampus minor.

General Anthropology—The comparative facility of speech

in the different races of mankind. Gratiolet's three divisions of the human species. The collection of ancient skulls of the Abbé Frère at Paris. The cranial researches of Barnard Davis, Broca, and Flower. Has the cranial capacity of the population been increasing in proportion to the progress of civilisation? Latin writers on the progressive deterioration of the human family. The recent controversy on the diminution of the average size of heads, as illustrated by the change in the size of hats. Herodotus on the influence of head coverings on the thickness of the skull; his description of Persian and Egyptian skulls. Skulls of the Egyptian mummies. Broca's comparison between the heads of twenty-four medical students and the heads of twenty-four ward attendants. Importance of anthropology to the student of the science of language.

What do we understand by the expression "Faculty of Speech?" Does the loss of this faculty necessarily imply organic lesion of structure? Richardson's experiments of freezing the cerebrum of animals—refrigerated frogs. Experiments on pigeons—the "Potentiality of Vitality." Action of chloroform on nerve tissue. Each brain cell a minute voltaic battery. Cerebral Thermometry—the temperature within the cranium compared with that of the scalp. Pernicious Anæmia—Bristowe, Leven, and Seppilli on hypoglobulia or diminution of the number of the red blood corpuscles.

On the Chemistry of the Brain—Thudicum on the phosphorised principles and the cerebromides. Is the variation in conversational power dependent on the chemical composition of the brain? The phosphorus theory considered—the supposed connection between the amount of phosphorus in the brain and intellectual vigour; views of Moleschott and Couerbe; the influence of intellectual activity upon the elimination of phosphoric acid in the urine. Concluding remarks. -

APHASIA,

OR

Loss of Speech,

AND

THE LOCALISATION OF THE FACULTY OF ARTICULATE LANGUAGE.



CHAPTER I.

Definition. Bibliography. Hippocrates; Sauvages. Description of the disposition and arrangement of the cerebral convolutions. Writers of the French School—Bouillaud; Andral; Drs. M. and G. Dax; Professor Broca, his *ne plus ultra* of pathological topography, summary of his two primitive and typical cases; Jules Falret; Trousseau. The celebrated discussion at the Academy of Medicine of Paris; case of M. Velpeau's barber; divers observations from the French press. Description of Professor Charcot's diagram of articulate and written Language.

APHASIA is the term which has recently been given to the loss of the faculty of language, and of the power of giving expression to thought, the organs of phonation and of articulation, as well as the intelligence being unimpaired. The pathology of this affection has been for several years past, and is still, the subject of much discussion in the scientific world; although only a symptom common to several morbid conditions, it has found a place in all systematic treatises on diseases of the nervous system; the Academy of Medicine of Paris

devoted several of its *séances* during the year 1865 to its special elucidation, and the medical journals of our own country, as well as those of France, Germany, and America, have lately contained a good deal of original matter bearing upon this obscure feature in cerebral pathology.

In a brief communication to the "Lancet" for May 20, 1865, I drew attention to the then existing state of our knowledge of the pathology of aphasia, this essay being, I believe, one of the earliest notices of this subject published in this country; since that period I have had occasion to make researches among various British and foreign authors, and having noticed a certain number of curious observations tending to illustrate the various theories in connection with loss or lesion of the faculty of speech, I have thought it not a useless task to give a *résumé* of the labours of scientific observers in various parts of the world, who are endeavouring to elucidate this complex question, adding thereunto the result of my own personal experience, the clinical history of my own cases being given with a considerable amount of minute detail.

It is my intention in the following treatise to consider the subject from a wider point of view than that adopted by previous writers; I propose to study the physical and psychical nature of the loss or perversion of language both natural and artificial, and I shall embrace all degrees of impairment of speech, both as regards language itself or its power of expression. I prefer, therefore, to use the word aphasia in its strictly etymological sense—*α φασια*—and I would thus apply it to all cases where speech is abolished or suppressed for whatsoever cause, believing that is more convenient for the purposes of

pathological research, thus to consider lesion of speech in its general and widest sense. The various prevalent physiological theories will be discussed, and I shall also enter into the domain of facts, and ask of clinical observation a solution of the difficulties with which my subject is surrounded.

From time immemorial, loss of speech, unconnected with any other paralytic symptom, must have been noticed, but it is only of late that the diagnostic value of this symptom has been recognised, and its pathology attempted to be explained; and it is probable, moreover, that early observers may have confounded paralysis of the tongue from disease of the hypoglossus, with that loss of the memory of words, and inability to give expression to the thoughts which characterise aphasia.

It has been stated that Hippocrates confounded aphasia with aphonia; I am inclined, however, to think that the reputation of the Father of Medicine has suffered from the fault of his English translator, for in his "Epidemics"* he describes a disease characterised by *sore throat and hoarseness of voice*, using the phrase "*πολλοὶ φάρυγγας ἐπόνησαν φωναὶ κακούμεναι*," the last two words of which have been erroneously rendered in English "*loss of speech!*" In another place, Hippocrates clearly distinguishes between loss of speech and loss of voice, by employing the words "*ἄναυδος*" and "*ἄφωνος*" in the description of the same case.

The following passage from Sauvages shows that the distinction was clearly understood by him: "Aphonia est plenaria vocis suppressio. Mutitas (quibusdam

* Hippoc. "de Morb. Pop.," lib. iii., sec. ii., p. 80, edit. Innys.

alalia) est impotentia voces articulatas edendi, seu sermonem proferendi.”

For the better understanding of the subject, it seems desirable to enter into a few anatomical details, and as the minute anatomy of the surface of the brain has not to my knowledge been so elaborately described by any English author, as by the late Professor Broca, I have condensed the following account from his classical work, “Sur le Siège de la Faculté du Langage Articulé.”

The anterior lobe of the brain comprises all that part of the hemisphere situated above the fissure of Sylvius (which separates it from the temporo-sphenoidal lobe), and in front of the furrow of Rolando, which divides it from the parietal lobe. The direction of the furrow of Rolando is nearly transverse; starting from the inter-hemispheric median fissure, it descends almost in a direct course, but with some slight flexuosities, terminating below and outside of the fissure of Sylvius, which it meets almost at a right angle, behind the posterior border of the lobe of the insula; in front this furrow is bounded by the transverse frontal convolution, and behind by the transverse parietal convolution.

The anterior lobe is composed of two stories or divisions, one inferior or orbital, formed by several convolutions called *orbital*, which lie on the roof of the orbit; the other superior, situated beneath the frontal bone, and under the most anterior part of the parietal. This superior division of the anterior lobe is composed of four fundamental convolutions, called the *frontal convolutions*; of these, one is posterior, the others are anterior. The posterior, slightly tortuous, forms the anterior boundary of the furrow of Rolando; it is therefore almost transverse,

and ascends from without inwards from the fissure of Sylvius to the great median fissure which receives the falx cerebri; it has been variously described as the *posterior, transverse, or ascending convolution*. The three other convolutions of the superior division are very tortuous and complicated; they have all an antero-posterior direction, and running side by side, extend from before backwards over the whole length of the frontal lobe, terminating behind at the transverse frontal, into which convolution they all three enter; they are distinguished by the names of *first, second, and third frontal convolutions*. The first and second frontal convolutions call for no special remark, but the precise relations of the third are important. This convolution, by its superior border, is contiguous to the second frontal in its whole length; in reference to its inferior border, the anterior half is in contact with the most external orbital convolution, whereas the posterior half is free, and forms the superior border of the fissure of Sylvius, which separates it from the temporo-sphenoidal lobe. In consequence of this latter relation, the third frontal is sometimes called the *superior marginal convolution*, the name of *inferior marginal* being given to the superior convolution of the temporo-sphenoidal lobe, which forms the inferior border of the fissure of Sylvius.

In drawing asunder these two marginal convolutions which bound the fissure of Sylvius, the lobe of the insula is exposed, which covers the extra-ventricular nucleus of the corpus striatum. The result of these relations is that a lesion which is propagated from the frontal to the temporo-sphenoidal lobe, or *vice versâ*, will pass almost necessarily by the lobe of the insula,

and from thence, in all probability, it will extend to the extra-ventricular nucleus of the corpus striatum, seeing that the proper substance of the insula which separates the nucleus from the surface of the brain is composed of only a very thin layer.*

As this subject has more particularly engaged the attention of French pathologists during the last few years, it is most convenient to consider first their researches, as the early literature of the localisation of speech is especially associated with the names of Bouillaud, Dax, and Broca.

As far back as 1825, Bouillaud placed the faculty of articulation in the frontal lobes of the brain, which he considered to be the organs of the formation of words and of memory; and he stated that the exercise of thought demanded the integrity of these lobes; he also collected 114 observations of disease of the anterior lobes accompanied by lesion of the faculty of speech.

Audral, who has investigated the subject very fully, analysed 37 cases, observed by himself and others, of lesion of one or both of the anterior lobes, and found that speech was abolished 21 times, and retained 16 times; when the lesion was unilateral, however, he has not stated on which side the morbid condition existed. He has also collected 14 cases where speech was abolished without any alteration in the anterior lobes, but where the lesion existed in the middle or in the posterior lobes. He cites the case of a woman, eighty years of age, who, three years before entering the hospital, was suddenly deprived of speech, without

* Vide Plate facing title page.

lesion of the intelligence, motion, or sensation, and who still retained the power of walking about; she presented, however, signs of organic disease of the heart, and died at last of pulmonary apoplexy. At the necropsy, there was found in the left hemisphere, softening of cerebral substance on a level with, and external to, the posterior extremity of the corpus striatum; and in the right hemisphere, a similar softening at the junction of the anterior and posterior half of the hemisphere.*

Then comes Dr. Dax, who places the lesion exclusively in the *left* hemisphere, basing his theory on the fact that when the subjects of aphasia are at the same time hemiplegic, the paralysis is always on the *right* side, his essay containing no less than 140 observations in support of his views.

His son, Dr. G. Dax, following in the wake of his father, wrote an essay, in which, whilst confirming the theory as to the lesion being in the left hemisphere, he localised it more especially in the anterior and external part of the middle lobe.

The *ne plus ultra* of pathological topography, however, was reserved to M. Broca, who originally defined the seat of lesion in aphasia to be "*the posterior part of the third frontal convolution of the left hemisphere!*" He, however, subsequently extended his area to the island of Reil, and to the extra-ventricular nucleus of the corpus striatum, and affirmed that as soon as a lesion occurs in the immediate neighbourhood of the left island of Reil, and especially in the convolutions directly above it, aphasia is the invariable result. M. Broca's views are detailed at some length in the proceedings of the Paris

* "Clinique Médicale," chap. iv., observ. xvii.

Anatomical Society for 1861, and the following is a brief summary of the two cases upon which he founded his somewhat startling theory.

A man named Leborgne, 50 years of age, and epileptic, was admitted into the surgical ward of M. Broca, at Bicêtre, for phlegmonous erysipelas, occupying the whole of the right lower limb. When M. Broca questioned him about the origin of his disorder, he only answered by the monosyllable "Tan," repeated twice, and accompanied by a gesture of the left hand. On making inquiries, it transpired that this man had been an inmate of the hospital in another wing for twenty-one years; that he had been the subject of epilepsy since infancy; that he had followed the occupation of a lastmaker up to the age of thirty, when he lost his speech, but no information could be elicited as to whether the loss of speech had come on suddenly, or had been ushered in by any other symptom.

On his admission at Bicêtre, he is stated to have been intelligent, understanding all that was said to him, and differing from a perfectly healthy man only in the loss of the faculty of articulate language, for whatever question was put to him, he invariably answered by the monosyllable "Tan," which, with the exception of a coarse oath ("S— n— de D—"), composed his vocabulary. At the end of ten years, a new symptom showed itself in weakness in the motor power of the right arm, which gradually resulted in complete paralysis of the right side, and he had already been bedridden seven years, when the occurrence of a surgical complication rendered it necessary to transfer him to the ward of M. Broca, who, in describing his *then* condition, states that

there was no distortion of the face, the tongue was protruded straight, the movements of that organ being perfectly free in every direction; mastication was unimpaired, but deglutition was effected with some difficulty, this being, however, due to commencing paralysis of the pharynx, and not to paralysis of the tongue, for it was only the third period of deglutition which was difficult; the voice was natural, and the functions of the bladder and rectum were unimpaired.

The patient having died in six days, a careful post-mortem examination was made, when all the viscera were found healthy, with the exception of the encephalon; the muscles of the right upper and lower extremities, however, were in an advanced stage of fatty degeneration and shrivelled up. The bones of the cranium were somewhat increased in density, the dura mater thickened and very vascular, the pia mater considerably injected in certain places, and everywhere thickened, opaque, and infiltrated with yellowish plastic matter of the colour of pus, but which, examined under the microscope, did not contain any pus-globules. The greater part of the frontal lobe of the left hemisphere was softened, and the destruction of cerebral substance had resulted in a cavity of the size of a hen's egg and filled with serum; the cavity was situated upon a level with the fissure of Sylvius, and was caused by the destruction of the inferior marginal convolution of the temporo-sphenoidal lobe, of the convolutions of the island of Reil, and of the subjacent part or extra-ventricular nucleus of the corpus striatum. In the frontal lobe, the inferior part of the *transverse frontal convolution* was destroyed, as also the posterior half of the *second and third frontal convolutions*, the loss of substance being most apparent, however, in

the third frontal convolution. The weight of the encephalon after the evacuation of the fluid filling the cavity, did not exceed 987 grammes (35 ounces), being less by 400 grammes (14 ounces) than the average weight of the brain in men of fifty years of age.

M. Broca then compares the result of the autopsy with the clinical observations during life; he considers that the primary seat of mischief was probably in the third frontal convolution, extending gradually to the others, and that this process of disorganisation corresponded to the first stage of the clinical history, which lasted ten years, and during which period the faculty of speech alone was abolished, all the other functions of the body being intact; the second stage, which lasted eleven years, and which was characterised clinically by partial paralysis, and then complete hemiplegia, he connects with the extension of the disease to the island of Reil and to the extra-ventricular nucleus of the corpus striatum.

The above case effectually converted M. Broca to the doctrine of localisation, and was the starting-point to all his subsequent brilliant researches in reference to the seat of articulate language.

A man, aged 84, formerly a sailor, was admitted into the surgical ward at Bicêtre on the 27th October, 1861, for a fracture of the neck of the femur. This man had been received into the hospital eight years before for senile debility, there being at that time no paralysis, and the organs of special sense and the intelligence being unimpaired. In the month of April, 1860, whilst descending a staircase he fell, suddenly became unconscious, and was treated for what was considered to be an attack of apoplexy; in a few days he was convalescent, there

never having been the least symptom of paralysis of limbs, but since the fit he had suddenly and definitely lost the faculty of speech, being only able to pronounce certain words articulated with difficulty ; his intelligence had received no appreciable shock ; he understood all that was said to him, and his brief vocabulary, accompanied by an expressive mimic, enabled him to be understood by those who lived habitually with him. He continued in this condition up to the time of the accident which caused him to be transferred to the surgical ward under the care of M. Broca, to whose questions he only answered by signs, accompanied by one or two syllables pronounced hastily and with visible effort. These syllables had a definite meaning, and consisted of the following French words—"oui, non, tois (for *trois*), and *toujours*." He also possessed a fifth word, which he only pronounced when he was asked his name, he then answered "Lelo," for Lelong, which was his proper name. The three first words of his vocabulary corresponded each to a definite idea. When he wished to affirm or approve he said "*oui*," employing the word "*non*" to express the opposite idea. The word "*tois*" expressed all his ideas of numbers, but as he was aware it did not correctly convey his thoughts, he rectified the error by gesture ; for instance, when asked how long he had been at Bicêtre, he answered *tois*, but raised eight fingers. When asked what was o'clock (it being then ten) he answered *tois*, and raised ten fingers. Whenever the three other words were not applicable, he invariably used the word *toujours*, which consequently for him had no definite meaning. There was no paralysis of the tongue, which was protruded straight, and was movable in every direction, each half being of the same thickness ;

sight and hearing were good, deglutition was normal, and there was no paralysis of the limbs, nor of the rectum or bladder.

M. Broca sums up the symptoms by calling attention to the following salient points: 1st, that the patient understood all that was said; 2nd, that he applied with discretion the four words of his vocabulary; 3rd, that his intelligence was unimpaired; 4th, that he understood numbers; 5th, that he had neither lost the *general* faculty of language nor the movement of the muscles concerned in phonation and articulation; and that therefore he had only lost the faculty of *articulate language*. The patient died in twelve days. Autopsy.—The bones of the cranium were somewhat thickened, and all the sutures ossified; the dura mater was healthy; the arachnoid cavity contained a considerable quantity of serum; the pia mater was neither thickened nor congested. The encephalon weighed, with its membranes, 1136 grammes (40 ounces), being far below the average weight of that of adult males. The right hemisphere, the cerebellum, the pons varolii, and the medulla oblongata were in a perfectly normal condition. In the left hemisphere, the lesion was limited to a loss of substance, very accurately defined, in the *posterior third of the second and third frontal convolutions*, a small cavity having been thus formed which was filled with serum. The walls of the cavity and the neighbouring cerebral tissue were firmer than usual; there were present some little spots of an orange-yellow colour, apparently of an hæmatic origin, and microscopic examination revealed the presence of blood crystals. The lesion then was clearly not softening, but the seat of a former apoplectic clot; and it will be remembered that the patient suddenly lost his

speech in an attack of apoplexy eighteen months before his death.

In alluding to the above two cases, M. Broca says that in the first case—that of Leborgne—it is only by comparing the different stages of the disease as observed during life with the post-mortem appearances, that he assumes the high probability of the lesion having commenced in the third frontal convolution; but in the second case—that of Lelong—there being no other symptom than loss of speech, and the lesion being strictly limited to the second and third frontal convolutions, he considers the aphasia was incontestably due to disease of that portion of the nervous centres. Whilst admitting that two cases are insufficient to resolve one of the most obscure and disputed questions in cerebral pathology, M. Broca considers himself justified in asserting that the integrity of the *third frontal convolution* (and perhaps of the second) appears indispensable to the exercise of the faculty of articulate language.*

A later writer of the French School, Dr. J. Falret, has collected from various authors no less than sixty-two cases, in the arrangement of which he adopts the following classification: 1st—All those cases in which the patients, whilst retaining intelligence and integrity of the organs of phonation, can only remember or articulate spontaneously certain words or classes of words, or even certain syllables or letters, but who can repeat and write any word that may be suggested to them by others. 2nd—Those in which the patients are only able to pronounce spontaneously certain words, syllables, or phrases

* “Sur le Siége de la Faculté du Langage Articulé,” p. 39.

always the same, not being, however, able to repeat other words dictated to them, although they retain the power of writing them; or if the power of repeating words thus dictated be retained, that of writing them is abolished. 3rd—Those more rare cases in which the patients can only pronounce certain words always the same, which, aided by gesture, enable them to express their thoughts, the power of reading, writing, and repeating words dictated, being abolished. Dr. Falret admits that this classification is artificial, and probably does not embrace all the varieties met with in practice. After paying a just tribute to recent workers in this field of observation, he concludes his very elaborate essay with remarking:—"That the question of perverted speech and of loss of the memory of words in cerebral affections is not yet matured; that it is more complex and more extensive than at first sight appears; that it borders upon the most obscure and the most disputed points of cerebral pathology and of the physiology of language; and that fresh observations of a detailed character are indispensably necessary, and that all generalisation and all absolute conclusions are for the present premature."*

Professor Trousseau has made this subject a prominent feature in his clinical lectures at the Hôtel Dieu, where he details several most interesting cases in which, when hemiplegia existed, it was with one exception always on the right side.†

During several months of the session of 1865, the Academy of Medicine of Paris became the arena for discussion upon this most interesting subject, in which

* *Des Troubles du Langage*, p. 53.

† "*Clinique Médicale*," tom. ii., p. 571.

many of the leading physicians and surgeons took a part. At one of these meetings, M. Trousseau gave the result of his statistical researches, and stated that in 134 observations collected by himself, 124 were confirmatory of M. Dax's proposition of localising the faculty of speech in the left hemisphere, and 10 were contrary. With regard to M. Broca's theory of attributing aphasia to a lesion of the third frontal convolution, he found that 14 cases were in favour of it, and 18 opposed to it; amongst the latter, he mentioned the case of a woman treated at La Salpêtrière by M. Charcot for right hemiplegia with aphasia, and where after death there was found a lesion of the left insula, and also of the third frontal convolution of the *right* side.

M. Trousseau also cited a case observed by M. Peter, the subject of which was a woman who had left hemiplegia, and who could only say, "*Oui, parbleu!*" who died from the effects of senile gangrene, and at whose autopsy a lesion was found of the third frontal convolution of the *right* side, also of the insula and of the posterior part of the corpus striatum, there being also embolism of the middle cerebral artery. Here, says M. Trousseau, are two cases of aphasia, with a lesion on the *right* side.

At another of these discussions, M. Velpeau alluded to the fact of M. Bouillaud having offered many years since, a prize of 500 francs for any well-authenticated case in which the two anterior lobes were destroyed, or more or less seriously injured, without speech being affected, saying that he (M. Velpeau) should claim the prize on the faith of the following case, with specimen, which he had presented to the Academy twenty-two years before.

In the month of March, 1843, a barber, sixty years of age, came under M. Velpeau's care for a disease of the urinary passages. With the exception of his prostatic disease, he seemed to be in excellent health, was very lively, cheerful, full of repartee, and evidently in possession of all his faculties; one remarkable symptom in his case being his *intolerable loquacity*. A greater chatterer never existed; and on more than one occasion complaints were made by the other patients of their talkative neighbour, who allowed them rest neither night nor day. A few days after admission this man died suddenly, and a careful autopsy was made, with the following results:—Hypertrophy of the prostate, with disease of the bladder. On opening the cranium, a scirrhus tumour was found, which had taken the place of the two anterior lobes! Here then was a man who, up to the time of his death, presented no symptom whatever of cerebral disease, and who, far from having any lesion of the faculty of speech, was unusually loquacious, and who for a long period prior to his decease must have had a most grave disease of the brain, which had destroyed a great part of the anterior lobes.

During the protracted debates at the Academy of Medicine, the pathological and psychological aspects of the question were reviewed with great force and eloquence, and science was enriched with a number of new facts, but the discussion closed without this learned body having arrived at any definite decision in reference to the localisation of the faculty of speech.

Several very interesting observations have been recorded in the French press, most of which are more or less corroborative of Broca's views, or at least of the

association of loss of speech with lesion of the *left* hemisphere.

In the "Gazette des Hôpitaux" for July 1st, 1865, Dr. Lesur mentions a remarkable case of a child who, in consequence of a fracture of the frontal bone caused by a kick from a horse, was trepanned about one inch and a quarter above the left orbit. The child recovered, but during the progress of the treatment, it was observed that pressure on the brain at the exposed part suspended the power of speech, which returned as soon as the pressure was removed.

Another case of traumatic aphasia has recently occurred in the practice of Dr. Castagnon, the subject of it being a young girl, aged 20, who was shot in the head, the accident resulting in a comminuted fracture of the antero-superior portion of the left parietal; although there was no depression of bone, several spiculæ were removed, and there was subsequently hernia cerebri and sphacelus of the protruded portion, which was removed by ligature. There was a comatose condition for six days, dextral paralysis and complete loss of speech for a month, at the end of which time she could speak, her vocabulary, however, being limited to four phrases, "*Mon Dieu! Jésus! mon père, ma mère.*" At the expiration of a year, the paralysis had subsided and the patient resumed her occupation, but although the intelligence was as perfect as before the accident, the young girl spoke but very little, and with great difficulty.*

An interesting case was observed at the Hospital St. Antoine by M. Jaccoud, the subject being a man

* "Gazette des Hôpitaux," October 12, 1867.

aged 44, suffering from Bright's disease, who, without any premonitory symptom, suddenly became aphasic, there being no other paralytic symptom except a limited facial paralysis. The aphasia was of short duration, and at the end of five weeks he spoke nearly as well as before, but soon sank from disease of the kidneys. At the post-mortem examination, there was observed fatty degeneration of both kidneys; insufficiency of the mitral valve, which was covered with small vegetations; the arteries of the circle of Willis were healthy, and there was no disease of the grey matter of the convolutions, but there was a limited and well-defined softening of the white substance in the immediate neighbourhood of the third frontal convolution of the left anterior lobe, great stress being laid on the fact that the convolution itself was in nowise affected.*

Professor Béhier, in one of his clinical lectures delivered at the Hôtel Dieu, mentioned the case of a woman who was admitted into one of his wards with right hemiplegia, the result of cerebral hæmorrhage, and in whom, one of the first symptoms following the effusion was aphasia, which assumed in her case a very exceptional form. This woman was born in Italy, and had resided both in Spain and in France; of the three languages she had thus acquired, she had completely forgotten Italian and Spanish, and had only retained a most limited use of French, in which language *she only repeated as an echo* the words pronounced in her presence, without, however, attaching any meaning to them.

In reference to the question of localisation, M. Béhier

* "Gazette des Hôpitaux," May 16, 1867.

stated, that after analysing the cases observed during the last few years, as well as those recorded by Abercrombie, Rochoux, Lallemand, and Andral, he had collected 122 observations opposed to the theories of MM. Bouillaud, Dax, and Broca ; in 82 instances, lesion of the anterior lobes had been observed without aphasia, and in 34 cases, aphasia coincided with disease in other parts of the brain.*

The next three cases I have to mention are instances of lesion of the third frontal convolution without aphasia ; but as the lesion was on the *right* side, they may be adduced as *negative proofs* of the truth of M. Broca's theory.

M. Fernet has recorded a case of left hemiplegia without aphasia in a female aged 36, and at whose autopsy the entire frontal lobe of the *right* hemisphere was broken down by softening. In the "Gazette Hebdomadaire" for July, 1863, M. Parrot relates a case of complete atrophy of the island of Reil, and of the third frontal convolution on the *right* side, with preservation of the intelligence and of the faculty of articulate language. M. Charcot has recorded the case of a woman, 77 years of age, who had left hemiplegia without embarrassment of speech or loss of the memory of words, and at whose autopsy there was found yellow softening of the surface of the *right* frontal lobe, the second and third frontal convolutions being completely destroyed, and there being no lesion of the central parts of the brain.

I need scarcely remark that cases like the three just mentioned, of lesion of the *right side without aphasia*, are

* "Gazette des Hôpitaux," March 20th, 1869.

quite as valuable in a statistical point of view, and tend as much to settle the *quæstio vexata*, as cases where the converse condition exists, viz., lesion on the *left* side *with* aphasia.

I now arrive at a class of cases which have a directly opposite pathological signification to those above mentioned, the eight following observations being all calculated to invalidate the recent theories as to the seat of articulate language.

M. Peter relates the case of a man who fractured his skull by a fall from a horse. After recovery from the initial stupor, there succeeded a *remarkable* *loquacity*, although after death it was found that the two frontal lobes of the brain were reduced to a pulp (*réduits en bouillie*).

In Trousseau's "Clinique Médicale," the following case is recorded :—In the year 1825, two officers quartered at Tours quarrelled, and satisfied their honour by a duel, as a result of which, one of them received a ball which entered at one temple and made its exit at the other. The patient survived six months without any sign of paralysis or of lesion of articulation, nor was there the least hesitation in the expression of his thoughts till the supervention of inflammation of the central substance which occurred shortly before his death, when it was ascertained that the ball had traversed the two frontal lobes at their centre.

M. Bérard has published the case of a man who was wounded in the forehead by the explosion of a mine; on being picked up, the patient was rational and gave an account of the accident; he walked to the hospital, and when seen there by Bérard, he had no paralysis and

spoke well. Death took place in 25 hours, and the autopsy showed destruction of the two internal thirds of the right anterior lobe, whilst the entire left anterior lobe was converted into a jelly, without any trace of organisation.*

M. Charcot, who has collected a number of observations more or less corroborative of M. Broca's assertions, has, however, recorded the case of a woman, aged 47, who from a fit of apoplexy suddenly became hemiplegic on the right side and aphasic. Her intelligence was unaffected, and memory reported as good, but her articulate language was reduced to the monosyllable "Ta," which she was in the habit of repeating several times over ("Ta, ta, ta, ta,") very rapidly and very distinctly every time she tried to answer any question or to communicate her own ideas; the tongue was perfectly free, and could be moved in every direction. After death, it was found that softening had destroyed the first and second convolutions of the temporo-sphenoidal lobe, the island of Reil, the extra-ventricular nucleus of the corpus striatum, and the intra-ventricular nucleus in its posterior half, the optic thalamus being intact; the frontal convolutions presented no alteration either in volume, colour, or consistence, the examination being conducted with the greatest care, and even in the presence of M. Broca, who frankly admitted this case to be at variance with his hypothesis.†

A woman, aged 73, was admitted into La Salpêtrière under M. Vulpian, her only symptom being loss of the power of speech; there was no paralysis of limbs, and

* Bulletin de la Société Anatomique, 1843, p. 121.

† Broca, op. cit., p. 6.

M. Vulpian looked upon this patient as a type of aphasia. After a few days she became hemiplegic on the right side, and died of pneumonia five weeks after admission. At the autopsy, softening was observed to a considerable extent in the posterior half of the supra-ventricular white matter of the left hemisphere, there being not the slightest indication of any lesion of the frontal or other convolutions; there was, however, obstruction of the left middle cerebral artery, caused partly by atheromatous thickening of the walls, and partly by a fibrinous deposit evidently of a recent date, the result rather of a thrombosis than of an embolism.

A man, aged 42, was admitted into the Hôtel Dieu, under the care of M. Trousseau, on 25th March, 1865. The sister of the ward, deeming him to be in extreme danger, began to exhort him to think about his last moments, when she received for an answer, "*N'y a pas de danger.*" Soon afterwards the dresser arrived, and to his first question the patient replied, "*N'y a pas de danger.*" Second question, same answer. It was evident that the man was aphasic, and the discovery that there was paralysis of the right side of the body confirmed the diagnosis. There was marked rigidity of the right upper extremity, the forearm being strongly flexed upon the arm; the tongue was protruded straight, and was freely movable; the right half of the face was paralysed, but the orbicularis palpebrarum was unaffected. Some weeks after admission he seems to have forgotten his old formula, for to every question he answered, "*Tout de même.*" Death occurred after four months' residence in the hospital, when the necropsy gave the following results. Almost the entire left hemisphere was converted into a vast cavity, having

the appearance of a true cyst, the walls of which were formed above by a very thin layer of cerebral matter flattened and even softened, and which was adherent to the much-thickened pia mater; in front and behind, all the remaining cerebral substance was yellowish and much softened. The orbital convolutions, the island of Reil, and the first and second frontal convolutions were in a perfectly normal condition; the third frontal convolution was pronounced healthy in that portion (the posterior third or half) which bordered the fissure of Sylvius and the furrow of Rolando, but it was evidently softened and almost destroyed in its upper part, where it was included in the general softening of the hemisphere, which also involved the corpus striatum and the thalamus opticus; the middle cerebral artery was not obliterated. This examination was made in the presence of Professors Trousseau and Guillot, and whilst showing the care with which this subject is being investigated by the French faculty, it possesses an additional interest from the fact that when the autopsy was completely finished and the brain mutilated by the successive slices that had been made, M. Broca arrived, and declared that the postero-external part of the third frontal convolution was yellow and softened, and that it had been thought healthy because it had been looked for where it did not exist.*

A man, aged 31, fractured his skull by falling backwards, and was admitted into the hospital at Rouen, under M. Flaubert; the patient lived 24 hours, and presented no symptoms either of aphasia or of paralysis, although at the autopsy the following lesions were dis-

* "Gazette des Hôpitaux," Sept. 28, 1865.

covered:—In the right hemisphere, the anterior and inferior extremity of the frontal lobe was destroyed, softened, and infiltrated with blood; the three frontal convolutions were affected, the third only in its anterior half. In the left hemisphere, there was complete destruction of the frontal lobe as far as the transverse frontal convolution, a pulpy mass only remaining consisting of a mixture of blood and cerebral matter; the convolutions of the island of Reil were flattened in both hemispheres.*

The last case to which I shall allude under this head is recorded by M. Languadin, of Nice, the subject of it being a soldier, who discharged the contents of a pistol through the mouth, the ball traversing the arch of the palate in the median line; the patient lived two months, *and speech was unaffected*, although after death it was found that the anterior lobe of the *left* hemisphere was entirely destroyed by suppuration.†

I must not omit to make a brief allusion to Dr. Ladame's essay on lesions of speech in connection with tumours of the brain. From his researches, it would seem that derangement of speech is not common in cerebral tumours, he having observed it only 44 times in 332 observations. According to Dr. Ladame's valuable statistics, tumours of the corpus striatum and of the pons varolii are more frequently attended by loss of speech than those occurring in any other part of the encephalon. He found that tumours in the *middle* lobes

* Font-Réaulx, "Localisation de la faculté spéciale du langage articulé," Thèse de Paris, 1866, Obs. xii.

† "Gazette des Hôpitaux," April 29, 1865.

The diagram, titled "THE BELL", illustrates a complex network of connections between various nodes. The nodes are arranged in a circular pattern and are labeled as follows:

- CAC** (top left)
- IC** (top center)
- CVC** (top right)
- ACW** (middle left)
- VCW** (middle right)
- CAL** (bottom left)
- CWL** (bottom right)

Arrows indicate the direction of connections between these nodes. Some arrows are labeled with the number "2". The connections form a dense web, with many arrows pointing in different directions. A dashed line encircles the entire network.

At the bottom of the diagram, a bell is shown. A curved arrow points from the bell to a box labeled "BELL". Another curved arrow points from the box "BELL" to a hand writing the word "BELL" on a piece of paper. A dashed line also connects the bell to the box "BELL".

C A C, Common Auditive Centre.	C V C, Common Visual Centre.
A C W, Auditive Centre of Words.	V C W, Visual Centre of Words.
C A L, Centre of Articulate Language.	C W L, Centre of Written Language.

were more frequently accompanied by lesion of speech than those occupying the *anterior* lobes, in the proportion of five to four. These curious results have led Dr. Ladame to dissent from the doctrine which would place the seat of articulate language in the anterior lobes of the brain.

Since the publication of my first edition, numerous valuable contributions have been made to the literature of aphasia by French writers, and I would especially call attention to Professor Charcot's clinical lectures at La Salpêtrière,* to the highly interesting and logical essay of M. Proust;† and to the exhaustive treatise of M. Bernard ;‡ to all of which I shall have occasion to allude in subsequent parts of this treatise.

Professor Charcot's lectures are illustrated by a diagram of Articulate and Written Language, a short description of which may be interesting to those studying the complex and intricate processes involved in the mechanism of speech.

* It is to be regretted that these admirable lectures, which have given such a stimulus to the study of aphasia, have not yet been published in full in France, although a portion of them has appeared in the "Progrès Médical" and other Parisian journals. A complete Italian translation by Dr. Rummo, however, has been published, entitled "Differenti Forme d'Afasia," Milano, 1884.

† "De l'Aphasie," par Adrien Proust, Paris, 1872 ; a work remarkable for its lucidity and incisiveness of exposition.

‡ "De l'Aphasie et de ses Diverses Formes," par le Dr. Bernard, Paris, 1885. This work is, with the exception of Kussmaul's, by far the most complete treatise on the subject that has come under my notice. It contains a full exposition of Professor Charcot's views, and I am indebted to M. Bernard for permission to copy any of the plates from this elaborate work, which I may consider desirable for the better elucidation of my subject.

A bell is supposed to ring near a child ; the sound makes an impression upon the peripheral expansion of the acoustic nerve, and is conveyed by the nerve itself to a sensitive cell in the cerebral cortex, in that region which constitutes the *common auditive centre* (C A C), where it forms a deposit, and effects some slight permanent change.

The word "bell" is pronounced before the child, and this sound is also conveyed by the acoustic nerve to the *auditive centre of words* (A C W), the centre specially organised for the intelligent perception of articulate speech.

The impressions thus produced are registered in the child's *ideational centre* (I C), and he associates the word "bell" with the recollection of the sound previously heard.

In order to designate the bell to others by the word thus learnt and retained, and to give outward expression to this "sound image," it is necessary to be able to pronounce it, and the education of a new centre is necessary ; the auditive centre of words having supplied the child with an internal image of the sound required, he transfers it to the *centre of articulate language* (C A L), which enables him to regulate and co-ordinate the movements of the organs for the articulation of words, and the child speaks the word "Bell."

A similar process is supposed to take place in reference to the visual and graphic aspect of language.

A bell is placed before the child's eyes, an impression is made upon the retina, and transmitted by the optic nerve to the *common visual centre* (C V C), where it forms a deposit.

The written word "bell" is placed before the child, and by means of the optic nerve, the written sign is conveyed to the *visual centre of words* (V C W), and the image thus produced is registered in the *ideational centre* (I C), as in the case of the auditive bell image.

In order to enable the child to write the word "bell," the internal image of which has been supplied to him by his *visual centre of words* (V C W), another centre is called into action, the *centre of written language* (C W L), and the child is able to write the word "Bell."

Without committing myself to the expression of an opinion as to the absolute correctness or otherwise of the above elaborate scheme of the learned Parisian professor, I feel it will be of use to me hereafter in considering the various dysphasic derangements described in this treatise.

CHAPTER II.

Bibliography continued. Schröder van der Kolk—his theory of the connection of speech with the olivary bodies. German writers—Romberg ; Bergmann ; Hasbach ; Nasse ; Von Benedikt and Braunwart ; Kussmaul.

FROM the brief summary I have given of the labours of the pathologists of the French school, it will be observed that the evidence deducible therefrom is of such a conflicting character, as to leave quite unsettled the complex question of the localisation of the faculty of speech. The history of the continental contributions to the literature of aphasia would, however, be very incomplete, without a brief glance at the researches of the German and Dutch physiologists.

Schröder van der Kolk, in his chapter on the accessory ganglia in the medulla oblongata, endeavours to establish a close physiological and pathological connection between the function of articulation and speech and the corpora olivaria. Besides citing numerous cases in illustration of his hypothesis, he gives an *a priori* reason for his theory in the fact that the corpora olivaria occur only in mammalia—that on comparing these organs as occurring among mammalia themselves, it is

to be observed that they nowhere exist on so extensive a scale, and are so fully developed, or present so strongly plaited a corpus ciliare, as in man; that in the higher mammalia, as the apes, they are most like those in man, and that in man they exceed in circumference by two or three times those of the chimpanzee. To Van der Kolk, these circumstances are suggestive of the idea that in man the corpora olivaria have a much more important function to discharge than in animals; and as these bodies are connected by special fasciculi with the nuclei of the hypoglossus, he looks upon them as auxiliary ganglia of that nerve, and as such, joined to it for the production of special combinations of movement. He also suspects that the very delicate combinations of motion in the human tongue in articulation and speech, may afford an explanation of the much greater size of the olivary bodies, and of their more intimate connection with the nuclei of the hypoglossus. In support of these views, Van der Kolk cites several cases of impairment of the faculty of speech, in all of which there was found after death lesion or degeneration of the olivary bodies. Of these observations the limits of this essay will only permit me briefly to allude to one which seems to me to be particularly pertinent to the subject now under consideration:—

G. van A., aged 22, had been dumb from birth, but not deaf. She had always enjoyed good health, and although idiotic, usually understood all that was said to her, but had never been able to form an articulate sound, and only now and then uttered a squeak. The patient having died from the effects of diarrhœa, the following appearances were observed at the autopsy.

On removing the hard, but thin and small skull, the cerebrum appeared small and ill-developed; the convolutions, especially on the anterior lobes, were slight and not numerous; in consequence of the diminished arching of the anterior lobes, the so-called convolutions of the third rank of Foville were very small, and scarcely shown on the inner longitudinal surface of the hemispheres; the convolutions on the posterior lobes were also but little developed. On the anterior lobes, beneath the *os frontis*, was seen a spot of the size of the palm of a small hand, and bloody exudation under the arachnoid, in which situation the *pia mater* was adherent to the cortical substance which was in many parts softened. On section, the grey and white substances were here and there thickly studded with red sanguineous points; the *thalami optici* presented a strikingly yellow colour; the *pons Varolii* was smaller and narrower than usual, and the *corpora olivaria* were unusually minute and slightly developed, being less than one-third of the normal size.*

Van der Kolk, in commenting on this case, remarks that as in this instance there was complete inability to articulate and consequent absence of speech, without deafness and without proper paralysis of the tongue which the patient could move, coinciding with an extremely defective development of the *corpora olivaria*; therefore the influence of these bodies on the complicated movements of the tongue in speech seemed scarcely to admit of doubt!

It will be observed that in laying great stress on the

* On the Minute Structure and Functions of the Spinal Cord and Medulla Oblongata. Translated by Dr. W. D. Moore, p. 140.

fact of the atrophy of the olivary bodies, the learned Utrecht Professor quite loses sight of the deductions to be drawn from the extremely imperfect development of the frontal convolutions, and also from the positive diseased condition of the anterior lobes; and it seems to me that both Bouillaud and Broca would have a word to say here in favour of their respective theories.

In further support of his views, Van der Kolk quotes two cases observed by Cruveilhier, in one of which the right corpus olivare had undergone grey degeneration, and in the other both these bodies were found as hard as cartilage.

Romberg mentions the case of a sailor, who, on being struck on the left side of the head by a loose rope, at once fell into a state of insensibility. After a quarter of an hour he recovered consciousness, but was found to have lost the use of the right half of the body, and to have become speechless. Three weeks afterwards, the mobility of the extremities had been restored, and the tongue could be moved in every direction without difficulty, but the faculty of speech was arrested; and although perfectly conscious, it was only with the greatest effort that he was able to utter a few inarticulate sounds. Some blood was taken locally on several occasions by leeches applied behind the left ear, a combination of sulphate of magnesia and tartar emetic being administered at the same time; and in three weeks from the commencement of this treatment his speech returned, and he was completely restored. He also mentions an interesting case of impairment of speech, with partial paralysis of the left side, which after death was seen to depend upon a large tumour, seated

in the right half of the pons Varolii, and extending posteriorly under the right olivary body.*

Dr. Bergmann, of Hildesheim, has written a masterly treatise on loss of memory and of speech, illustrating it by a series of well recorded cases, to some of which I propose very briefly to refer.†

A ploughman, Wt., aged 40, of short stature, fell through the trap door of a garret upon the left side of the head. Much blood immediately flowed from the left ear and mouth, the bleeding from the ear continuing for two days. For four weeks he lay stunned and without power of recollection; he heard nothing, his speech was unintelligible, and his eyes were closed. When his consciousness was fully recovered, it was noticed that both eyes were turned towards the nose (there was double convergent strabismus), the pupils were somewhat dilated and sluggish, there was intolerance of light and diplopia; his memory was observed to have suffered in a peculiar manner—the memory of *proper names and of substantives* was abolished, whilst that of *things and places* remained unimpaired; and he also had retained the power of correctly speaking and using *verbs*. He knew what he wished and ought to say, but could not connect the letters of substantives one with another. He knew exactly the place, the way, the streets, and their names, although he was quite unable to give utterance to these names. The same defect was noticed in reference to the furniture, and in fact to every other object.

* On the Nervous Diseases of Man. Translated by Dr. Sieveking, pp. 310, 407..

† Einige Bemerkungen über Störungen des Gedächtniss und der Sprache, Allgemeine Zeitschrift für Psychiatrie, 1849, S. 657.

He was shown a penknife, a key, a looking-glass, and he described their use by a periphrase. He said of the scissors which were shown him—it is what we cut with. On pointing to the windows he said, it is what we see through—what admits light.

A man of large stature, strong constitution, and ruddy complexion, with knowing, lively, expressive eyes, for upwards of ten years had never spoken a single word, not even a yes or no, when alone or in company. He heard well, had a good memory and a proper supply of ideas. He wrote a particularly firm and correct hand, and was never tired of putting his ideas and foolish fancies on paper. From these written effusions, it was seen that his principal delusion was that he considered himself a great lord and potentate, who sent his decrees and decisions forth to the world. He was always accusing others, but in the most dignified language; and he commanded and gave his instructions after the manner of one learned in the law of the highest courts of appeal. It was evident that he had intelligence, but a perverted one; he heard and understood, as his written answers and other behaviour clearly showed. He was docile, he waited on the other patients like a brave nurse, and willingly employed himself with ordinary handiwork. During the many years that this man remained under observation, no means were left untried to ascertain whether he could be made to speak; but no fraud, no surprise, no sudden or sharp pain, no electric shock, no hot iron, no entreaty, no threat had ever succeeded in extracting from him even the slightest yes or no.

Dr. Bergmann, in commenting upon this singular case, and in endeavouring to reach the explanation of the physiological and pathological enigma involved in it,

suggests two hypotheses: That there may have been a fixed idea, a fixed will, a caprice, an obstinate strong purpose, his physiognomy seeming to say—I remain still firm and true to myself, I will carry out my purpose, I will triumph, and I will not yield. Then on the other hand, if one considers that he was good-hearted and well-disposed, obliging and friendly, and that he was scarcely ever angry, notwithstanding all the opposition to his wishes, it would seem more probable that there was a real organic inner momentum (*inneres organisches Moment*), some hidden impediment which produced loss of speech.

The only remaining case from this author to which I shall allude is that of Anna W., æt. 30, who up to the age of twenty was sound in mind and body, when a nervous fever laid the foundation of mental disturbance and chronic headache. After a time weakness of memory was noticed, and she became indifferent, unfeeling, and unsympathising. There was this peculiarity about the memory—that it was particularly weak and almost extinct in reference to subjects of recent date, whilst she could well remember the events of the earlier period of her illness. For upwards of two years she had never spoken a word, however much one roused her, although her manner gave unmistakable evidence that she could hear and understand what she heard. She had thoughts, conceptions, and ideas; there must then, says Dr. Bergmann, be an organic defect which rendered her unable to give vent to her thoughts by means of words or even by a sound.

I shall again have occasion to refer to Dr. Bergmann's highly philosophical treatise in another part of this essay.

Dr. Hasbach, of Geldern, has recorded the following case of *left hemiplegia with aphasia*:—A merchant, aged thirty-six, with a robust thick-set body, who, from speculating in the funds, had become in a short time very rich, was suddenly seized in the night after a hearty meal with apoplexy, resulting in complete paralysis of the left arm and leg, and loss of speech. After a month's treatment, the paralysis of the leg had so far subsided that he could walk slowly with the aid of a stick, the upper extremity remaining, however, entirely paralysed and deprived of sensation. With the exception of one single phrase, he did not recover the power of speech, the only words he could articulate being, "*gerechter Gott*," which he would repeat a hundred times each day. There was also this remarkable peculiarity, that although he could pronounce clearly and distinctly so difficult a phrase as "*gerechter Gott*," he was quite unable to articulate separately the letters of which this expression was composed.*

Dr. W. Nasse, of Bonn, has written a valuable essay on defects of speech, in which he mentions the case of a man thirty years of age, who, after repeated attacks of apoplexy, was paralysed on one side of the body, retaining possession of his mental faculties. The movements of his tongue were unfettered, and he could make himself understood; in the middle of his sentences, however, he often applied wrong words, but immediately recognised his mistake, expressed concern for it, and would endeavour to extricate himself from his difficulty by gesture and periphrase. If the required word were named before him, he would repeat it with glib tongue,

* "*Allgemeine Zeitschrift für Psychiatrie*," 1852, S. 262.

and could also write it down. After repeated attacks of cerebral congestion, the power of speech progressively diminished, and he gradually fell into a state of imbecility.

Dr. Nasse, in his general remarks, calls attention to the fact that most frequently proper names and substantives, words which are first learnt in childhood and which are in more general use, seem to disappear, whilst verbs and adjectives which are acquired later, remain preserved. He also thinks the loss of the memory of words bears no relation to the condition of the muscular power.*

Von Benedikt and Braunwart have an excellent and exhaustive paper on lesions of the faculty of speech, from which I shall only quote the following case of *aphasia from lead poisoning*, as reported by Heymann.†

Jacob Astheiner, journeyman plasterer, aged sixteen, had suffered for many years from time to time, with lasting headache. Eventually, in the otherwise taciturn patient, were observed great vivacity and wantonness, and the ordinary symptoms of plumbism. A few days afterwards he ceased to answer any questions, and was unable to utter a syllable ; there was also agraphia. A fortnight later his speech partially returned, and he spoke a few words very indistinctly, and would for many hours together cry out *Va-ater, Mau-aüter*, and also *Hu-unger*, with joyful, excited voice. This patient gradually but entirely recovered.

During the last few years numerous works in reference

* "Allgemeine Zeitschrift für Psychiatrie," 1853, S. 525.

† "Canstatts Jahresbericht," 1865 ; Dritter Band, S. 31.

to the pathology of aphasia have been published in Germany, amongst which I may mention those of Sander, Th. Simon, Samt, Gogol, and Wernicke; but by far the most important is that of Professor Kussmaul of Strassburg, whose elaborate and exhaustive treatise I have had frequent occasion to consult, and to which I shall again refer in subsequent chapters; it is a work quite encyclopedic in character, full of valuable information, and should be in the hands of all who desire to possess a compendium of all that is at present known of the pathology, diagnosis, and treatment of disturbances of the faculty of speech.*

It will be observed that in some of the preceding cases, the subjects of them were lunatics or persons of weak mind; in my opinion, they are none the less valuable on that account; in fact, Broca's first two cases, the publication of which has given rise to so much discussion and research throughout the scientific world, were observed by that distinguished pathologist in an institution devoted to the treatment of the various forms of mental disease. Although aphasia is by no means a very common symptom in the insane, I cannot but think that the alienist physician possesses unusual opportunities for contributing to the solution of what still remains one of the most difficult questions in cerebral pathology.

* Die Störungen der Sprache. Versuch einer Pathologie der Sprache, von Dr. Adolf Kussmaul. Leipzig, 1881.

CHAPTER III.

Bibliography continued. English, Scotch, and Irish writers. American contributions to the literature of Aphasia—S. Jackson; Hun; Bigelow; Wilbur; Austin Flint; Seguin; Hammond.

IN the two preceding chapters, I have endeavoured to give a short sketch of the literature of aphasia as illustrated by continental pathologists, and I now proceed briefly to notice the researches of the different members of the Anglo-Saxon race.

Amongst British authors the earliest observations that have come under my notice are those of Crichton, who mentions several cases bearing on the subject under consideration, from which I have selected the following :

An attorney, in his seventieth year, having indulged in great venereal excesses, was suddenly seized with great prostration of strength, giddiness, insensibility to all the concerns of life, and every symptom of approaching fatuity. When he wished to ask for anything, he constantly made use of some inappropriate term ; instead of asking for a piece of bread he would probably ask for his boots, and if these were brought he knew they did not correspond to the idea he had of the things he

wanted, and therefore he became angry, yet he would still demand some of his boots or shoes, meaning bread. If he wanted a tumbler, he would ask for a chamber utensil; and if it happened to be the said chamber utensil he wanted, he would ask for a tumbler, or a dish. He evidently was conscious that he used wrong words, for when the proper expression was employed by another person, and he was asked if it was such a thing that he wanted, he always seemed aware of the mistake, and corrected himself by adopting the appropriate expression. This gentleman was cured of his complaint by large doses of valerian and other proper remedies.

A man, aged 70, was seized with a kind of cramp in the muscles of the mouth, accompanied with a sense of tickling all over the surface of the body, as if ants were creeping on it. A few weeks later, after having experienced an attack of giddiness and confusion of ideas, a remarkable alteration in his speech was observed to have taken place. He articulated easily and fluently, but made use of strange words which nobody understood, and he himself was conscious that he spoke nonsense. What he wrote was equally faulty with what he spoke.

Crichton also mentions instances of persons who suddenly found that they could not remember their own names, the most striking being that of an ambassador at St. Petersburg, who, on calling at a house where he was not known by the servants, and wishing to give his name, could not at that moment remember it, and turning round to his companion said, with much earnestness, "For God's sake tell me who I am."*

* "An Inquiry into the Nature and Origin of Mental Derangement, comprehending a Concise System of the Physiology and Pathology of the Human Mind." Vol. i., pp. 371, 375, 369. London, 1798.

Of the above cases, the first two are instances of paraphasia; of the third, it may possibly be thought that it scarcely falls within the range of defects of speech; it has, however, an indirect bearing upon my subject, and I have therefore deemed it worthy of record.

Baillie relates the history of a gentleman, aged fifty-six, who, after an attack of right hemiplegia, lost the recollection of the words of his own language, except a very few, "Yes," "No," "Mr. Reed," "Yesterday," which he employed on all occasions, and pronounced with the greatest distinctness, exhibiting none of that thickness in his pronunciation which is so common in paralytic patients; his countenance expressed a full share of understanding, and he seemed to comprehend all that was said to him. In the account of the necropsy, the brain and its membranes are described as perfectly natural in appearance, but the left vertebral artery was enlarged, and its coats had become opaque. There was considerable effusion into the lateral ventricles, which probably coincided with the occurrence of the coma which set in a few days previous to his death.*

Bright describes a case of dextral paralysis with aphasia, occurring in a man aged 63, who had a few years before married a woman much younger than himself; he had also for several years been the subject of an open ulcer in the leg, which had healed up six or seven months before the paralytic seizure. After death there was found softening of the middle and posterior lobes

* "Medical Transactions of the College of Physicians," 1813, vol. iv., p. 9.

of the left hemisphere, the anterior lobe being unimpaired. The vessels at the base of the brain, particularly the carotid and its branches, were very much ossified, and the mitral valve was converted into an irregular bony mass. There is a very beautiful plate appended to the description of this case, from which it would appear that the disease commenced in the cortical portion.*

Dr. Copland, who has written *de omnibus rebus et quibusdam aliis*, has, of course, not omitted to speak of lesions of speech; our great medical lexicographer, however, seems only to have viewed them as motor defects, and not as due to the loss of an intellectual faculty; and the only case which is given in detail in his work on apoplexy, is clearly one of disease at the origin of the lingual and glosso-pharyngeal nerves, and not an instance of lesion of the faculty of articulate language.†

Sir Thomas Watson relates a remarkable case of a gentleman, who had a sudden fit of apoplexy, for which he was freely bled, and who on the third day was apparently quite recovered. On the fifth day, after a long conversation, he suddenly lost the thread of his discourse, became confused, and misappropriated words—for instance, wishing to say “camphor,” he called it “pamphlet.” After a few days the right side of the body became paralysed, and he died at the expiration of a fortnight from the commencement of the attack. At the post mortem, an abscess was found at the upper part of the left hemisphere, in the centre of which was

* Reports of Medical Cases, Vol. ii., p. 177.

† Copland on Palsy and Apoplexy, p. 37.

a small fibrous tough mass of dull red colour, the coagulum doubtless of blood effused at the period of the apoplectic seizure.*

Dr. Todd mentions several instances of hemiplegia with aphasia, the paralysis being, with one exception, always on the right side. In one case only the post mortem appearances are given, with Dr. Todd's usual attention to details. The hemiplegia was explained by disease of the central ganglia, but there was likewise considerable softening (colourless) of the white substance of the hemisphere, where were numerous small vessels in a state of fatty degeneration, and also an abundance of compound cells. The grey matter was not stated as being affected.†

Dr. Todd's attention was evidently never given to the special consideration of speechlessness as a symptom of brain disease, and in one case, he says, "it was evident that very grave lesion had occurred, sufficient to inflict so severe a shock on the brain as to destroy the power of speech."

Dr. Forbes Winslow, in his remarkable chapter on the "Morbid Phenomena of Speech," has entered with considerable detail into the question of the cerebral localisation of that faculty, illustrating the subject by allusion to a number of highly interesting cases, from which I have selected the following for brief allusion.‡

A gentleman had an attack of apoplexy, consequent upon extravasation, the effects of a rupture of one of the

* Practice of Physic, Vol. ii., p. 511.

† Clinical Lectures on Diseases of the Brain, p. 247.

‡ On Obscure Diseases of the Brain, p. 497.

cerebral vessels. He rallied, had a second attack, and again recovered. At the expiration of eighteen months a third attack ensued, when he became hemiplegic and entirely lost his speech, and died in two months, having never uttered a vocal sound. At the examination, a small patch of 'softened brain was found in the pons Varolii, surrounding a clot which had been deposited on that ganglion. The other portions of the cerebral mass were apparently in a healthy condition, with the exception of some of the vessels being closed by deposits of bony matter.

A patient suffering from cancer of the uterus, which completely prostrated her, was suddenly seized, in the middle of the night and without any known cause, with an almost complete dumbness, which only enabled her to say "yes, yes," to all questions, whether they were contradictory or not. She retained possession of her intelligence, for she was neither paralysed nor insane. If she was requested to write what she had to communicate, she traced an assemblage of letters on the paper to which no meaning could be attached.

A clergyman, whilst reading the Litany, became suddenly speechless, without losing his consciousness, and was obliged to leave the church. He continued in the same state for an hour, being perfectly sensible of everything that was going on about him, and was able to write on a piece of paper a request that a certain physician should be immediately summoned. Two days after the loss of speech, he was in a state of apoplectic coma, in which he died, no autopsy being permitted.

A gentleman, after many premonitory warnings, fell down in a fit, described as a combination of epilepsy

and apoplexy, and for two days his life was in imminent danger; he, however, partially recovered, but with an inability to give anything like a clear expression to his wishes, what he said being quite unintelligible. He was able to pronounce words with great clearness, but they were sadly misplaced and transposed. By adopting the course of writing down what he said, and then re-arranging the words in their proper order, his family were able clearly to understand his wishes. This state of brain and impairment of speech continued with slight intermission for nearly a fortnight, accompanied by acute pain in the occipital region. Abstraction of blood by cupping was followed by a decided mitigation of the symptoms. Mercurial purgatives were administered, the head was shaved, and counter-irritation applied behind the ears. At the end of five days he was able to converse coherently for a few minutes, but if he continued in conversation beyond that time, he again began to jumble and misplace his words. Minute doses of bichloride of mercury in combination with tincture of cinchona, were subsequently administered with the greatest benefit, and in the course of a few months he entirely recovered.

Dr. Winslow adds that in fifty-four cases he has detected after death a considerable amount of disease of the anterior lobes without being accompanied during life with any perceptible loss of speech. In one case of softening of the cerebellum, the principal symptom was great perversion of the faculty of speech, without complete loss of power over this function, the anterior lobes being free from all organic alteration. In another case a large encysted abscess was discovered at the base of the brain, which produced during life the most singularly

remarkable modification of the faculty of speech, the patient's misplacement of words being at times most eccentric and grotesque, and the power of articulation seeming occasionally to be entirely lost. In a third case a tumour of a malignant character was found in the cerebellum, which produced complete loss of speech.

The next observation to which I shall direct attention is one of extreme interest from its exceptional character, being a case of impairment of the faculty of articulate language from *disease of the spinal cord*, reported by Dr. Maty in the third volume of the "London Medical Observations and Inquiries."

The Count de L., aged 35, was overturned in his coach from a high and steep bank; the accident was followed by no head symptoms, and he soon recovered from the effects of a severe contusion of the left shoulder, arm, and hand, and went through the fatigues of a military campaign. Six months afterwards, however, weakness of the left arm occurred, with difficulty of articulating certain words. Some months later the difficulty in speaking and in moving the left arm increased; the limb eventually became withered, and he could scarcely utter a few words, and those only monosyllables. During all this time the Count continued able to read and write, and spent his time in the most abstruse subjects, and up to the period of his death, which occurred four years after the accident, he preserved to the last the highest intellectual power. The description of the autopsy is too minute to admit of its being given here in detail; the medulla oblongata was enlarged by one-third, and more compact than natural, and the spinal membranes were very tough. The spinal marrow itself

had acquired such a solidity as to elude the pressure of the fingers, and to offer the resistance of a callous body, this peculiarity being most apparent in the cervical portion.

The following unique case of aphasia, resulting from the rupture of a vessel within the orbit, was communicated to the Norwich Pathological Society by my colleague, Dr. Copeman, who had extracted it from the private notes of the late Mr. Norgate.

Sarah Hase, æt 29, a spare, slender woman, in good general health, and in the last stage of pregnancy, was seized with an acute lancinating pain in the left side of the head and temple, extending deep into the orbit; the eyelids became swollen, and she experienced a throbbing and constant "boiling" just above the brow. At five o'clock the following morning, with very little effort and before the midwife could arrive, she was delivered of a child. Soon afterwards the pain and distension caused by pressure on the ocular globe from behind became almost intolerable; and it now became quite evident that a vessel of some size at the back of the orbit had been ruptured. Leeches were now plentifully applied around the part, followed by cold lotions. In the evening of the same day, the eye was noticed to be protruding and nearly immovable from pressure, and it was now that for the first time Mr. Norgate noticed a remarkable hesitation in answering questions, although she was perfectly conscious; she occasionally employed one word for another, mistook letters, and dropped syllables in articulating words. The next day the eyeball was more perfectly fixed, the agony was extreme, and although the cornea was then clear, the retina was

amaurotic, and the iris quite insensible to light, vision of course being lost. She now confused her words so much as to be quite unintelligible to those around her; she tried to make it understood by signs that she wished to write, and in attempting to do so she invariably made use of parts of words. Omitting the daily details, suffice it to say that after scarification of the conjunctiva and other appropriate treatment, there was a little relaxation of pressure; the globe was less distended, and the power of expressing herself began to improve; in proportion as absorption proceeded, so the power of language increased, and in a few days she could articulate and converse as well as ever. This patient told Mr. Norgate afterwards that she comprehended everything that was said during the period in which she had been unable to express herself.

The above case is, I think, unique of its kind, although a somewhat similar one is quoted by Van der Kolk, from the "*Gazette Médicale de Paris*," of September 5th, 1857, where it is stated that in consequence of a wound, a bony splinter from the *os frontis* above the left eye compressed the anterior part of the hemisphere, subsequently causing loss of speech, which faculty was completely regained after the removal of the fragment by the trepan.

I would call attention to the fact that the inference to be drawn from these two cases is not in favour of the theory of M. Broca, but rather favours the system of Gall, who located the faculty of language in that part of the anterior lobes which lies above the orbital plates; for it was clearly this region that was the seat of pressure in both cases, and not the neighbourhood of the so-called Broca's region.

The next case I shall mention was also observed by a Norwich pathologist—my colleague, Mr. Cadge, having at one of the meetings of the Norwich Pathological Society, related the following case of a cerebral tumour sufficiently large to take the place of the left anterior lobe, speech continuing unaffected to the last.

C. D., æt. 50, was a strong stout man, remarkable for his physical power and invariable good health, and moderately temperate in his mode of life. Although not an ill-tempered or violent man, he had a habit of wrangling with, and abusing those in his employ; he was addicted, in fact, to a kind of chronic vituperation, which meant little, but sounded a good deal, for he had a loud voice and a copious vocabulary. The first indication of his illness that attracted notice, was that he ceased to upbraid, and became suspiciously good-humoured and quiet; this change in his manner occurred only six months before his death. The next symptom was violent but intermitting headache; at first it was almost confined to the back of the head, afterwards it passed over to the forehead, but was never restricted to one or other side of the head; he also had a constant singing in the left ear. His sight soon became defective, and about three months before death he became totally blind, large retinal extravasation being observable by the ophthalmoscope. As the sight failed, his mind and faculties began to waver, and he became droll and almost childish. At no period of his illness was there any continued paralysis; on one occasion he staggered and fell whilst walking, but quickly recovered. Other than this, there was no loss of power or sensation; his voice was clear and his articulation distinct. Six months from the commencement of his illness he suddenly

became apoplectic and comatose, and died in twelve hours.

Necropsy:—The cerebral membranes were adherent ; there was nothing like excessive congestion in any part, nor was there more than a little excess of fluid either in the ventricles or at the base of the brain. There was some trouble in peeling off the membranes from the convolutions, this being as much or more due to over softness of the latter than to unnatural adhesion ; nothing like inflammation or active congestion was present. Hidden in the left anterior lobe of the brain was a tumour of about the size of a hen's egg ; the tissue around it being considerably softened, it was not easy to ascertain very precisely its exact limits and relations. It seemed to occupy the left lobe chiefly, encroaching slightly on the right across the corpus callosum ; behind it pressed on the corpus striatum, and was visible in the anterior cornu of the ventricle ; in front it encroached upon the grey matter of the convolutions, but did not reach the surface ; below it rested on the root of the orbit and on the olfactory nerve. The tumour itself was of softish consistency, not unlike tubercular matter ; in some parts it had almost a gelatinous aspect, and under the microscope nothing was visible but a multitude of compound cells and free nuclei, and a few large corpuscles, but no fibrous structure whatever.

After stating that the inference was that the tumour was malignant, (its rapid development encouraging that view,) Mr. Cadge asks, why a tumour in the anterior lobe should cause blindness, as there was no pressure on, or inflammation around, the optic nerves, nor were the optic thalami or tract at all interfered with ? He also asks how it is that there was neither aphasia nor paralysis

of the right side? This last question of Mr. Cadge I shall endeavour to answer in a subsequent part of this work, when analysing the mass of evidence I have collected, with the view of testing the value of the different statements that have been made as to the seat of the faculty of speech.

Mr. Dunn, whose researches in physiological psychology are so well known, has published several very interesting cases of loss or impairment of speech, to one only of which I shall briefly refer.

A young girl, aged eighteen, accidentally fell into a river, from which she was extricated in a state of suspended animation; prompt assistance being rendered, sensibility was restored, and she eventually recovered. Ten days afterwards she was seized with a fit, lay in a state of complete stupor for nearly four hours, on rallying from which, it was observed that she had lost the power of speech and hearing, and was also deprived of the senses of taste and smell, and for three months her only medium of communication with the external world were the senses of sight and touch. About three months afterwards, an incident occurred in the family which roused her sensibility and suddenly brought into play one of her suspended powers—the faculty of speech.

Seeing her mother in a state of excessive agitation and grief, she became excited herself, and in the emotional paroxysm of the moment, she suddenly ejaculated, “Wh—a—t’s the mat—ter?” From this time she began to articulate a few words, but she neither called persons nor things by their right names. Nine months later, under sudden and overwhelming emotional excitement, she fell into a state of insensibility of many

hours' duration, but which proved critical and sanatory, for she awoke in possession of her natural faculties and former knowledge; her speech was restored, but she had not the slightest recollection of anything that had taken place during the interval of the twelve months that her faculties had been suspended.

Beyond all doubt the observer who has done the most in this country to elucidate the subject of cerebral loss of speech is Dr. Hughlings Jackson, who, in the London Hospital Reports for 1864, has given the details of thirty-four cases of hemiplegia with loss of speech. Of these cases, the paralysis was observed thirty-one times on the right side and three times on the left; the heart was more or less affected in twenty instances (valvular disease existing in thirteen cases); in four cases there was loss or defect of smell. I much regret that want of space will not allow me to dwell on this most interesting communication; there are, however, two cases in this collection to which I must briefly allude. One is a case of *aphasia with left hemiplegia* occurring suddenly in a gentleman 64 years of age, who fourteen years before had received a very severe blow in the right occipital region, which had left him ever afterwards deprived of the power of smell and taste. In the other case the patient, although continuing aphasic, had recovered the power to *swear*, which Dr. Jackson explains on the principle that ejaculatory expressions are prompted by the emotions and not by the will; he also considers that oaths and similar interjectional expressions are not parts of speech in the broad sense in which the words that form them are, when used to convey intellectual propositions.

In a more recent article in Reynolds' "System of Medicine," Dr. Jackson observes that the association of defects of speech with symptoms pointing to disease of the left hemisphere is not so striking in children as in adults.

The medical journals of the last few years contain a variety of interesting cases, to the salient points of which only a passing allusion can be made.

In the "Medical Times" of July 9th, 1864, a case is recorded of a man aged twenty-one who was admitted into the Middlesex Hospital, under Dr. Stewart, with *left* hemiplegia without loss of speech, the attack having been preceded by choreic movements of the left arm and leg. A week later he was suddenly seized with paralysis of the *right* side, with loss of speech; consciousness, however, being retained. After death both middle cerebral arteries were filled with fibrinous plugs and semi-coagulated blood; at each end of the Sylvian fissure was a mass of diffuent brain substance, of about the size of a walnut.

In the "British Medical Journal" for December 14th, 1867, Dr. Bastian reports a case of right hemiplegia with aphasia, where after death the arteries at the base of the brain were all notably diseased and contained large white calcified patches at intervals; the left hemisphere showed very many patches of red softening, which were almost always strictly confined to the grey matter of the convolutions, the principal patches of softening being met with in the *third or inferior frontal convolution*, in a portion of the adjacent ascending parietal* near its

* I presume Dr. Bastian means the posterior or ascending frontal.

commencement, and in the superior frontal. The great mass of the white matter of the hemisphere appeared healthy and of normal consistence, as also the central ganglia, pons, and medulla. The heart was large, weighing eighteen ounces; the aortic valves and a portion of the great tongue of the mitral, showed a very early atheromatous change.

One of the most recent observations that have fallen under my notice is that recorded by Dr. Simpson, in the "Medical Times" of December 21st, 1867, as a case of "*Extensive Lesion of the third left frontal convolution of the cerebrum without aphasia.*" W. M., æt. 62, was admitted into the Gloucester County Asylum, in February, 1857, and had been subject to epilepsy from his early youth; he never had an apoplectic attack as far as could be ascertained, nor had he at any time suffered from loss of speech. During the ten years he was under observation in the asylum, he had no brain symptoms beyond those ordinarily associated with epilepsy, no paralysis, and no impairment of speech. He died in November, 1867, of bronchitis.

Autopsy:—Calvarium thick and heavy; cranium unsymmetrical, being elongated in the left oblique diameter. Dura mater non-adherent and healthy; arachnoid opaque throughout, but more particularly on the upper parts of both hemispheres; pia mater normal. The grey matter was somewhat atrophied, of firm consistence, but paler than normal; white matter also atrophied, and the interspaces and ventricles filled with serum. Both orbital divisions of the frontal lobes were indented, from undue prominence of the upper walls of the orbits. On the left side, and implicating the *posterior part of the*

third or inferior frontal convolution, a large depression existed which appeared to be the remains of an apoplectic clot; it was of irregular shape, about an inch and three-quarters in its antero-posterior, and an inch and a half in its transverse diameters; extending internally to within five lines of the olfactory bulb, and in front to within an inch of the anterior margin of the hemisphere; it was deepest in the centre, where it measured half an inch from the general line of surface. The brain tissue was stained of a brownish-yellow colour, and there was considerable puckering, with induration round the margins of the depression. Microscopical examination showed distinct feathery crystals of hæmatoidin. The cortical substance was greatly thinned, being reduced to a mere line in the centre of the depression; the island of Reil appeared healthy, and the other parts of the brain presented no great deviation from the normal standard; the cerebral arteries were slightly atheromatous. Weight of encephalon, 42½ oz.

These three cases, the leading features only of which I have just described, are of extreme interest from the circumstance that in all of them the clinical history is completed by a minute and well-recorded description of the post-mortem appearances. The first case is remarkable from the fact that the patient possessed the power of speech in its perfect integrity whilst the paralysis was confined to the *left* side; but, having to a great extent recovered from this first attack, a sudden invasion of *dextral* paralysis was immediately followed by loss of speech. The second case, that of Dr. Bastian, will be claimed by M. Broca and his advocates in support of their theory as to the localisation of speech, for there is

a high probability that the diseased action may have commenced in the third or inferior frontal convolution and its neighbourhood, as the greatest amount of softening was observed in this region; another interesting feature in the case was the existence of complete hemiplegia, with only disease of the convolutional grey matter to account for it. This remarkable communication, which is written in Dr. Bastian's usual clear and lucid style, is well worthy of a careful study, being pregnant with original thought and the results of philosophical research. The case of Dr. Simpson is unique, and cannot be dismissed without a word of comment. Here there was disease of the posterior part of the third left frontal convolution, (the exact region of Broca,) without any impairment of speech. I have already mentioned cases of aphasia where the frontal convolutions were all described as healthy, and I shall have others to record, which have occurred under my own immediate observation; but hitherto we have had no example of the converse condition, that is, *disease of the third left frontal convolution without lesion of speech*, and it has even been stated that there is no case on record in which positive disease of this precise spot existed with integrity of speech.

The researches of our northern neighbours, the Professors of the "*Modern Athens*," must be considered as most valuable contributions to the literature of the subject we are now discussing.

Abercrombie, whose work on cerebral disease is perhaps more quoted than that of any other British author of the past generation, has recorded numerous cases of

cerebral loss of speech, of which I can only briefly allude to the following, which are in direct opposition to the recent theories as to the seat of the faculty of articulate language.

A man, aged fifty, who had been for some time subject to cough and bloody expectoration, was seized with frontal headache and some confusion of thought, which appeared chiefly in a tendency to misapply words; he soon lost the sight of the right eye, his speech became indistinct, and, after some time, inarticulate; and he died in two months from the commencement of the cerebral symptoms. At the autopsy there was found, at the *posterior* part of the left hemisphere, a soft and vascular cyst, containing about two ounces of a thick, colourless fluid, coagulable by heat, and exactly resembling the albumen of an egg; the cerebral substance around the cyst was softened, the brain in other respects being healthy.

A man, aged sixty, after some premonitory symptoms, was suddenly attacked with left *hemiplegia and inarticulate speech*, his intelligence, however, being unimpaired. At the end of a month he was suddenly seized with *perfect loss of speech*, which was followed in a few hours by coma, from which he did not recover. The substance of the brain was found healthy, except at the outer part of the right hemisphere, where there was a considerable portion in a state of complete *ramollissement*. The pia mater on the upper part of both hemispheres appeared thickened, and was remarkably vascular; there was considerable subarachnoid effusion, and both lateral ventricles were distended with fluid.

The same author mentions the case of a child, four years and a half old, whose articulation had been for

many months very imperfect, and at whose autopsy the corpora olivaria, the crus cerebelli, and the tubercula mammillaria were found in a state of cartilaginous hardness; other parts being sound.*

In the report of the Edinburgh Asylum for 1866, Dr. Skae relates a case of right hemiplegia where the patient had lost the power of all articulate speech, except the words, "aye, aye," and at whose autopsy an effusion of blood was found in the *left posterior lobe* of the brain.

Dr. Sanders and the late Dr. Scoresby Jackson have recorded a case with autopsy, more or less corroborative of Broca's theory.

The subject of Dr. Sanders' case was a woman aged 43, who was admitted into the Royal Infirmary at Edinburgh, on November 16th, 1865, with incomplete paralysis of the right side, defective speech, and loss of the memory of words. Without following Dr. Sanders in his detailed account of the clinical history of this case, suffice it to say that two days after admission the patient complained of pain in the *left* leg, with impaired motion and anæsthesia; signs of obstruction of the left femoral artery showed themselves, and gangrene of the corresponding limb occurred, from the effects of which she died about two months from the date of her admission. Autopsy:—The right hemisphere presented no lesion. On carefully examining the left hemisphere, *the posterior part of the inferior left frontal convolution*, where it forms the anterior margin of the fissure of Sylvius, together with a small portion of the adjoining orbital convolution, was observed to be collapsed, and depressed below the

* "On Diseases of the Brain and Spinal Cord," pp. 176, 273, 431.

natural level. The flattened and depressed portions felt soft and fluctuating to the touch, and on cutting into the softened part, the grey matter was found to be thinned off from within, and the white cerebral substance was completely softened and eroded, presenting an appearance like dirty cream. The softening extended inwards to the immediate neighbourhood of the corpus striatum, without, however, involving it. The other convolutions of the anterior lobe were not affected, but there existed a separate softening near the posterior extremity of the fissure of Sylvius. The corpora olivaria were normal, and there was no other lesion of the encephalon. There was no embolism in the cerebral arteries, but there was a little thickening in the wall of the artery of the left Sylvian fissure.*

In Dr. Scoresby Jackson's case, the subject of it, James A., 48 years of age, was thrown from a van and received a wound on the left temple. This accident did not prevent him from working, but he ever afterwards complained of a pain in the head; and two months after the injury he was suddenly seized with right hemiplegia and aphasia, and died seven weeks later. Autopsy:—The heart was of natural size, and on the mitral valve were numerous vegetations, and loose fibrinous masses. The vessels at the base of the brain were atheromatous at several points, and there was

* After the above lines were written, I was favoured with a private communication from my lamented friend, the late Professor Sanders, in which he informed me that his later dissections tended to show that in speech-palsy it is the island of Reil that is at fault rather than Broca's convolution. For the details of cases published by Dr. Sanders in support of this view, see "Lancet" for June 16th, 1866, and "Edinburgh Medical Journal" for August, 1866.

embolism in some of the branches of the left middle cerebral artery. There was softening of a considerable portion of the left hemisphere, which was most advanced in the island of Reil and in the posterior part of the third frontal convolution, the anterior end of the same gyrus not being involved.*

Dr. Gairdner, of Glasgow, has published an extremely interesting case of epileptic seizure, followed by a speechless and somewhat cataleptic state, without coma or evident paralysis. There was recovery of the intelligence to a considerable extent, but with continued aphasia, death ensuing in ten weeks during an epileptic paroxysm. This patient, although unable to express himself in writing, was able to copy handwriting set before him with tolerable accuracy. The necropsy, which was made with great care, revealed no cerebral lesion whatever beyond general and diffused congestion of the vessels of the pia mater, the smaller ones of which were surrounded with slight granular deposit.†

Dr. Robertson, of Glasgow, after giving a most interesting account of three typical cases observed by himself, gives the following summary of the views he entertains as to the cause of aphasia:—"There is a lesion usually in the left hemisphere of the brain, of efferent fibres passing between the convolutions and the great co-ordinating centres, probably at some point of a line extending from the external frontal convolution to the corpus striatum, so that voluntary motor

* "Edinburgh Medical Journal," February, 1867.

† "Glasgow Medical Journal," May, 1866.

impulses for the articulation of language cannot be transmitted. The essential morbid change is, therefore, *motor*, and not *mental*.*

In the "Journal of Mental Science" for April, 1872, a case is recorded by Dr. J. Batty-Tuke and Dr. John Frazer, in which the posterior half of the third left frontal convolution was completely destroyed, both as regards the grey and white matter, and the only defect in language was partial verbal amnesia. The other points of interest were stated to be the laying bare of the extra-ventricular nucleus of the corpus striatum without its being morbidly affected, and the absence of right hemiplegia.

Now, this observation has an extremely important bearing upon a disputed point in the pathology of aphasia, and it has been cited by the authors as a complete testimony to the erroneous nature of Broca's convolutional theory. As, however, the correctness of this deduction has been challenged by a distinguished neurological authority, it cannot be otherwise than useful to glance at the leading features of a case which has given rise to so much discussion.

M. R., aged 54, a single woman, was received into the Fife and Kinross Asylum on December 14th, 1868, symptoms of insanity having developed themselves only four weeks previous to her admission. The history of the case is that of an apoplectic seizure eleven years previous to the above date. Whilst working in a field,

* "The Pathology of Aphasia," "Journal of Mental Science," January, 1867.

she suddenly fell down and became unconscious, remaining insensible for some weeks. There seems to have been no paralysis, but complete speechlessness existed for some time ; from this, however, she completely recovered, and, previous to her admission, she had become rather talkative. During the whole period of her residence in the asylum, two peculiarities in her speech were observed—a thickness of articulation resembling that of general paralysis, and a hesitancy when about to name anything, which was most marked when she came to a noun. Latterly, she could not recall even the commonest terms, and periphrases or gestures were used to indicate her meaning. She was always relieved and pleased if the words were supplied to her, when she invariably repeated them. For example, she would say, "Give me a glass of ——" If asked if it was "water," she said, "No." "Wine?" "No." "Whisky?" "Yes, whisky." Never did she hesitate to articulate the word if she heard it. She had a peculiar stoop in her walk, with constant pain, increased on pressure, at the third and fourth dorsal vertebræ ; she became paraplegic two months before her death, which occurred three years after her admission.

Autopsy. Calvarium very dense and thick, tables thickened, diploe thin, membranes healthy, except some old adhesions on the left side, at the anterior part. Brain appeared to be slightly shrunk, but the amount of serum which escaped ($1\frac{1}{2}$ ounces) was not sufficient to indicate general atrophy. On stripping off the dura mater on the left side, some slight adhesions were found between the layers of the arachnoid ; these were easily detached, and exposed an excavation of the brain substance at the postero-infero-external part of the left frontal lobe. Its outline was irregular, its cavity filled with serum, and narrow white bands sprang from its sides. On emptying the cavity, its dimensions were

found to be as follows :—In its long axis, from before backwards, parallel to the fissure of Sylvius, two and a quarter inches obliquely; vertically one and three-sixteenths of an inch; in its deepest part it was three-quarters of an inch, but generally only half-an-inch. This lesion had destroyed posteriorly the inferior fourth of the ascending parietal convolution, leaving a small posterior portion of the knuckle in which this gyrus ends; the inferior third of the ascending frontal, the inferior margin of the second frontal, and the *posterior half of the third frontal convolution*. At the inferior margin there was a narrow ridge of slight eminence, which might have been the remains of the inferior border of the third frontal; with this exception, the destruction of the posterior half of this convolution was complete; both as regards its grey and white matter. The bottom of the cavity seemed to be an anatomical limitation, as it was smooth, rounded, and presented no evidence of morbid action; incision proved it to be the extra-ventricular nucleus of the corpus striatum. Microscopical examination of the grey matter taken from the orbital lobule, and from the various superior gyri, showed few nerve cells, and these few had undergone almost complete fatty or fuscous degeneration. There was slight dilatation of the aorta and a few atheromatous patches on the valves, which were thin, and the mitral orifice was small.

As I before stated, this case has provoked a good deal of adverse criticism, and Dr. Wilks has expressed the opinion that it by no means warrants the inference which Drs. Tuke and Frazer have drawn from it; indeed, on the contrary, he regards it as a case highly corroborative of the views of Broca and his followers.*

I refrain from personally commenting upon this controversial case at this stage of my treatise, but I shall have occasion to refer to it later on. I will merely point out that the inference to be drawn from it depends upon what is understood by the word Aphasia; the patient evidently understood what was said to her, and also

* "Journal of Mental Science," July, 1872, p. 307.

what she read, but she was unable to express herself in articulate language until the word was suggested to her, when she instantly recognised it, and repeated it. According to the broad definition which I have adopted in this work, it is clearly a typical instance of one of the various morbid conditions that I have included under the generic term of Aphasia.

One of the most important cases bearing upon the question of the localisation of the faculty of speech, has been published by Dr. Foulis, of Glasgow.

A house-painter, aged 64, was admitted into the Royal Infirmary of Glasgow, under the care of Dr. Scott Orr, on August 9th, 1878, for cardiac dropsy, which proved fatal at the end of two months. The history of the clinical symptoms is not given in detail, as it is stated that they in no way varied from those usual in such cases, and were not therefore of special interest. Dr. Foulis, however, states that there was not the least symptom of any defect in the speech of the patient, who could talk with perfect fluency and correctness; nothing was noticed which in any way pointed to cerebral mischief, except a tendency when lying quiet in bed to carry on imaginary narratives in a casual sort of way, and to refer to events as presently occurring, which had no existence except in his imagination. Otherwise, he was intelligent and quiet, and, when spoken to, he would give correct and sensible replies. After death, Dr. Foulis noted the following morbid appearances:—

Necropsy.—The body was badly nourished; the legs were dropsical. Twenty-two pints of slightly turbid fluid, with flakes of lymph floating in it, were found in the abdominal cavity; a quantity of a similar fluid in

the right pleural sac, along with a web-shaped layer of recent lymph; and a little clear serum in the left pleural sac. The heart was dilated and enlarged, weighing 20 oz.; there were a few firm vegetations on the mitral valve, the other valves were healthy. The aorta was wide and slightly tortuous, its lining membrane was thickened and atheromatous. The right lung was much compressed, its pleural surface was like chamois-leather in appearance, its tissue was subcrepitant and still capable of floating in water. The left lung was rather œdematous. The lining of the air-tubes generally was reddened. The liver was commencing to become cirrhotic; in the gall-bladder were inspissated bile and several scores of calculi, some white and faceted, others black and mulberry-shaped. The gall-ducts and the portal vessels were patent. The kidneys were both in advanced cirrhosis. The splenic capsule was thickened and white. The urinary bladder was slightly hypertrophied. The gullet and intestines were normal. There were a few patches of red mottling in the mucous membrane of the stomach, as if from punctiform hæmorrhage, but no ulceration. The spine had a strongly marked dorsal kiphosis (not angular), and a lateral curve convex to the right side in the upper dorsal region; there were irregular exostoses over the bodies of the dorso-lumbar vertebræ. The skull and dura mater were healthy; the arteries at the base of the brain were atheromatous. The third left frontal convolution was almost entirely destroyed, along with two-thirds of the island of Reil; over this area, the pia mater was disorganised and converted into a non-vascular, transparent, shreddy membrane, adherent to the pulpy-brown surface of the irregular excavation where the brain-

substance was missing; the arachnoid was raised at this spot by clear fluid which filled the gap, and gelatinous-looking bands ran across the fluid between the arachnoid and the pia mater. The brain and its membranes otherwise seemed to be free from disease.

Here then we have a description by a pathologist of eminence, of an anatomically demonstrated lesion of the third left frontal convolution, without the functional disturbance said to be connected with disease in that locality. The patient was right-handed, there was no hemiplegia, and aphasia was not at any time a feature in the case, although the destruction of the third left frontal convolution was so complete as to abolish any function which it may have exercised. Dr. Foulis, in commenting upon the symptoms observed during life, and the pathological appearances noted after death, maintains that the theory of Broca is rendered untenable by the consideration of this case.*

Medical science is indebted to the physicians of the "*sister island*" for much valuable information communicated by them in reference to cerebral loss of speech.

In the *Dublin Quarterly Journal* for February, 1851, Graves has recorded a most singular instance of amnesic aphasia, limited to substantives and proper names. The subject of it was a Wicklow farmer, fifty years of age, who, after an attack of hemiplegia, was affected with an

* "British Medical Journal," March 15th, 1879, p. 383. Dr. Foulis' description was illustrated by an engraving, by which it was seen that the only part of the third left frontal convolution which remained was a thin shred at the extreme posterior end, and that the island of Reil also was to a large extent excavated.

incapacity to employ nouns and proper names, he being able in other respects to express himself well. This defect was accompanied by the following singular peculiarity: that he perfectly recollected the *initial letter* of every substantive or proper name for which he had occasion in his conversation, though he could not recall to his memory the word itself. He consequently made for himself a little pocket dictionary of the words in most general use, including the proper names of his children, servants, and acquaintances, and during a conversation he would look in his dictionary till he found the word he wanted, keeping his finger and eye fixed on the word until he had finished the sentence, but the moment the book was closed, the word passed out of his memory and could not be recalled, although he recollected its initial, and could refer to it again in his dictionary when necessary.

The learned Dublin professor, in his clinical lectures, has also recorded two most interesting cases, where loss of speech was at first the only morbid symptom, but he does not dwell on the pathology of this singular affection; and, strange to say, although the cases recorded are typical instances of aphasia, he seems to imply that in loss of speech the defect may be in the glottis rather than be the result of cerebral lesion!*

In the same Journal for February, 1865, is a valuable paper by Dr. Banks, in which he mentions the following very curious case:—

A gentleman, aged 54, was eight years since attacked with paralysis of the right side and aphasia. At first the loss of speech was complete, but after twelve days he

* "Clinical Medicine," p. 433.

could say a few words. Before his attack he was a ripe scholar, and had taken much pleasure in reading the best classical authors ; but when his stock of words had increased so as to enable him to converse a little on ordinary subjects, it was observed that his memory had quite failed him with respect to Greek and Latin. For six years he continued without improving to any considerable extent, but still he was gradually acquiring new words. For the next two years his progress was more rapid ; he laboured hard, and almost learned over again all that he had forgotten, so as to be able to read his old favourite classical authors once more. The accomplished Trinity College Professor adduces this case to prove that, even in aphasia with paralysis, the mind may remain unclouded, and the power of speech, even after years, may be re-established.

At the annual meeting of the British Medical Association held at Dublin in August, 1867, I had the pleasure of reading a paper on the "Localisation of the Faculty of Speech," after which an interesting discussion took place, in which Professor Gairdner, Drs. Lyons, Hayden, Lalor, Gibson, &c., took a part, and some extraordinary instances of the sudden loss of speech, and of the intellectual results that followed, were mentioned.

During my visit to Dublin, Dr. Lyons kindly called my attention at the Hardwicke Hospital to an extremely interesting case of aphasia occurring as a complication of cerebro-spinal arachnitis.

The subject of it, John Oyden, a delicate boy, aged eleven years, was admitted into the hospital on May 30th, being reported three days ill. His symptoms were those of well-marked cerebro-spinal arachnitis, of pure

type, and intense degree. The face was flushed, the pupils were dilated, and the patient complained of much acute pain in the head and back of the neck, which extended down the spine for a considerable distance. On June 3rd the usual eruption made its appearance. On June 25th the patient became affected with aphasia, the right side being at the same time paralysed. He remained in this state for many days; the only words he was able to utter were "day, day," which was his answer to all inquiries. In the beginning of July he rallied a good deal and regained the power of speech, but on August 27th he again became the subject of aphasia, in which state he died.*

Dr. Popham, of Cork, in a very elaborate paper in the *Dublin Quarterly Journal*, mentions the following case, which he says bears on M. Broca's views.

Mary Murphy, aged sixty, was admitted to the Union Hospital with right hemiplegia and impaired speech. The memory of words was very defective, and the articulation confused; for "Thank you, sir," she said "Fancy sell;" and being asked what her husband, a pedlar, sold, she replied "procties and pudding pans," which Dr. Popham found out meant "brooches and bosom pins." She eventually died of pneumonia, when the following appearances were observed at the post-mortem examination:—The heart was covered with fat, the mitral orifice was narrow, its margins ossified, and there were some vegetations on the auricular surface. There was considerable effusion under the arachnoid

* The above very meagre report of this remarkable case is taken from the "British Medical Journal," of September 28th, 1867.

membrane. On careful examination of the left hemisphere, the convolution of Broca was softer in consistence than the neighbouring parts, and the remains of an apoplectic cyst, of the size of an almond, and empty, was situated close to the anterior third of the corpus striatum, and running parallel to its course.

I now arrive at the consideration of the labours of our American cousins, beginning with Dr. S. Jackson, of Pennsylvania, who records the following curious case.

The Rev. Mr. —, æt. 48, endowed with intellectual powers of a high order, of a sanguine temperament, with latterly a strong tendency to obesity, having exposed himself to the influence of the night air, received a check to the cutaneous perspiration. The next morning he awoke with a headache, and when a friend went into his room to inquire after his health, he was surprised to find Mr. R—— could not answer his questions. Dr. Jackson having been summoned, found the patient in full possession of his senses, but incapable of uttering a word; the tongue was not paralysed, but could be moved in every direction; all questions were perfectly comprehended and answered by signs, and it could be plainly seen by the smile on the countenance, after many ineffectual attempts to express his ideas, that he was himself surprised, and somewhat amused at his peculiar situation. The face was flushed, the pulse full and somewhat slow, and to the inquiries if he suffered pain in the head, he pointed to his forehead as its seat. When furnished with pen and paper, he attempted to convey his meaning, but he could not recall words, and only wrote an unintelligible phrase,

"Didoes doe the doe." Forty ounces of blood were drawn from the arm and before the operation was completed speech was restored, though a difficulty continued as to the names of things, which could not be recalled. The loss of speech appearing to recur in fifteen minutes, ten ounces more blood were abstracted, and sinapisms supplied to the arms and thighs alternately. These means were speedily effectual, and no further return of the affection took place.

Dr. Jackson, in analysing this case, calls attention to the following facts. Firstly, sudden suppression of the cutaneous transpiration, succeeded by cerebral irritation and determination of blood to the brain: secondly, frontal pain immediately over the eye: thirdly, perfect integrity of the sensations and voluntary movements: fourthly, the general operations of the intellect undisturbed; ideas formed, combined, and compared; those of events, of time, recalled without difficulty: fifthly, loss of language or of the faculty of conveying ideas by words though not by signs; this defect not being confined to spoken language, but extending to written language also.*

Dr. Hun, of Albany, mentions the case of a blacksmith, æt. 35, who, before the present attack, could read and write with facility, but who had been labouring for several years under a disease of the heart. After a long walk in the sun, he was seized in the evening with symptoms of cerebral congestion, remaining in a state of stupor for several days. After a few days he began to recover from this condition, and understood what was

* "American Journal of Medical Sciences," February, 1829, p. 272.

said, but it was observed that he had great difficulty in expressing himself in words, and for the most part could only make his wants known by signs. There was no paralysis of the tongue, which he could move in all directions. He knew the meaning of words spoken before him, but could not recall those needed to express himself, nor could he repeat words when he heard them pronounced; he was conscious of the difficulty under which he was labouring, and seemed surprised and distressed at it. If Dr. Hun pronounced the word he needed, he seemed pleased, and would say, "Yes, that is it," but was unable to repeat the words after him. After fruitless attempts to repeat a word, if Dr. Hun wrote it for him, he then would begin to spell it letter by letter, and, after a few trials, was able to pronounce it; if the writing were now taken from him, he could no longer pronounce the word; but after long study of the written word, and frequent repetition, he would learn it so as to retain it and afterwards use it. He kept a slate, on which the words he required most were written, and to this he referred when he wished to express himself. He gradually learned these words and extended his vocabulary, so that after a time he was able to dispense with his slate. He could read tolerably well from a printed book, but hesitated about some words; when he was unable to pronounce a word, he was also unable to write it until he had seen it written; and then he could learn to write as he learned to pronounce, by repeated trials. At the end of six months, by continually learning new words, he could make himself understood pretty well; often, however, employing circumlocution when he could not recall the proper word, somewhat as if he were speaking a foreign language, imperfectly learned.

Dr. Hun infers, from what precedes, that there is a portion of the brain connected with language or the memory of words, as distinct from the memory of things and events; and that there is another portion on which depends the co-ordination of the movements of articulation. It will be observed that in the above case, the impression made on the acoustic nerve was not sufficient for rendering the articulation of the word possible, but that it was necessary that an impression should be made upon the optic nerve. Dr. Hun asks whether this can be explained by the supposition of a more intimate connection between vision and articulation, or by the fact that the impression on the acoustic nerve is transient, whilst that on the optic is more permanent.*

The same author has also recorded a most remarkable case of hysterical aphasia in a married man, aged 43, who followed the occupation of a livery-stable keeper. The clinical history is given by Dr. Hun with great detail, but it contains so many points of interest that I transcribe it in full.

In December, 1863, while at work in his stable about 4 p.m., he felt some nausea; he walked home, and during the evening lost his speech; an hour later he lost his sight and hearing, but retained his consciousness; at the end of another hour he had several severe convulsions. After the convulsions he was perfectly conscious, but did not regain his sight, hearing, or speech for twenty-four hours.

Six months after, he had another attack which was not preceded by nausea; he lost his speech, sight, and hearing at 6 p.m.; at nine he commenced to have con-

* "American Journal of Insanity," April, 1851.

vulsions, which lasted until 6 a.m. There was no unconsciousness either during or after the fits. His sight returned the next day, but he remained speechless and deaf for forty-eight hours. Three weeks later he had a similar attack.

He now continued well till April 20th, 1865, when he was startled and excited by the discharge of a cannon, causing the horse he was driving to become difficult to manage. Soon after this he had a headache, and in a few hours became speechless, blind, and deaf, but retained his consciousness. He wrote upon a slate what he wished to communicate, and when his hand holding the pencil was guided by that of another person, he understood what was written; he could open his mouth and move his tongue freely, but swallowed with some difficulty; he made signs as if he felt some obstruction in his throat; the pulse was slow and regular. In the course of the night convulsions came on, and during these his body and limbs stiffened, his head was thrown backwards as in a tetanic spasm, but the respiration was not interrupted, the face was not flushed, and he did not bite his tongue. The convulsive attack lasted about five minutes, when the rigidity suddenly relaxed, and the patient stated that he suffered severely during the spasm. At the end of twelve hours, his speech, sight, and hearing suddenly returned, and he regained his usual good health.

In October, 1865, he had another attack; this time he lost his speech and hearing, but retained his sight. He went about town, communicating with those he met by means of his slate and pencil. This continued for several days, when, after some excitement, he lost his sight and had several severe convulsions like those

described above. After the convulsions he regained his speech, sight, and hearing, and felt perfectly well.

On March 14th, 1867, at 5 p.m., he complained of headache and nausea, and an hour later he was seized with convulsions, during which he lost his speech, sight, and hearing. Dr. Hun had the opportunity of witnessing one of these convulsions, which began as he entered the house. It commenced with a slight twitching of the muscles of the face and shoulders, and then suddenly a strong tetanic spasm (*opisthotonos*); all the muscles of his body were rigid. This lasted for about fifteen minutes, when, in an instant of time, the whole body was drawn in the opposite direction (*emprosthotonos*), and was as rigid as it had been before; so suddenly and powerfully did the change take place, that one of the four men holding him was thrown to the floor. After about twenty seconds the muscles relaxed, and he remained quiet for a few minutes, during which time he made signs for the slate, and wrote that he had "a burning pain in his side, and a severe headache." After this interval of repose, his left arm and leg were strongly flexed, and his head and body drawn to the left side, while the muscles of the right side remained relaxed. Dr. Hun then, by guiding his hand and holding his pencil, made him write the word "Yes," which he understood, although he was speechless, blind, and deaf, for he immediately wrote, "I am suffering great pain; can you not help me?" He had already taken two doses of chloroform and ether, and Dr. Hun gave him a hypodermic injection of morphia in the left arm, but he did not seem to feel the needle penetrate the skin, nor did he show any signs of pain when the left arm was pinched; upon pinching the right arm, he drew it away;

during all this time his pulse was slow, regular, and strong; the next morning he was able to see, but was unable to speak or hear.

March 21st. Dr. Hun met him walking about the streets, communicating with others by means of his slate and pencil; he could neither speak nor hear. On the previous day his hearing had returned to him without any convulsion or warning of any kind; he retained this faculty for a few hours and then went to sleep, and when he awoke, he was again deaf as well as speechless.

March 26th. He had four severe convulsions, after which he still remained speechless and deaf until June 6th, when, after a severe headache, he recovered his voice for fifteen or twenty minutes, but could not hear.

June 8th. While in New York upon business early in the day, he was attacked with headache and with twitching of the muscles, but no regular convulsions; in the evening he began to talk, and half an hour afterwards his hearing was restored, but at the same time he became blind! The next morning, when he awoke, he felt perfectly well, and was able to speak, see, and hear. He told Dr. Hun that the day after an attack he always passed a great deal more urine than usual, and that he had an idea that the obstruction he experienced in his throat, was due to the attempts made by a tape-worm to get out of his stomach.

He now remained well until November 16th, when he had a dull headache during the morning, which increased in severity until 6 p.m.; he then had convulsions, with loss of speech, sight, and hearing; at eleven o'clock the convulsions ceased, and his sight returned, but he remained deaf and speechless until November 29th, when

he had headache, and a slight twitching of the muscles during the morning; at 6 p.m. he had convulsions lasting two hours, after which his speech and hearing again returned. Since that time he continued perfectly well, and was able to attend to his business as usual.

Dr. Hun, in commenting upon the exceptional features of this most interesting case, characterises it as one of hysteria, basing this opinion upon the following analysis of the chief symptoms observed:—1st. He retained his consciousness during the attacks. 2nd. No spasm of the glottis, his face remaining pale. 3rd. He did not bite his tongue. 4th. Globus hystericus and dysphagia. 5th. Increased urinary secretion after the attacks. 6th. Localised analgesia (as shown when the needle of the hypodermic syringe was introduced into the left arm) without anæsthesia (as shown by his being able to hold his slate and pencil with both hands). 7th. The restoration of speech, sight, or hearing seemed always to be accompanied by convulsions.*

Professor Bigelow, of Boston, has reported a remarkable case which occurred in the practice of Dr. Harlow of Vermont, of very extensive injury to the brain, without loss of the power of articulate language.

On September 13th, 1848, the foreman of a mine, a young and healthy man, was engaged, with a tamping-iron in his hand, in ramming down a charge of powder in a rock to be blasted. The tamping-iron was an iron bar, pointed at one end, three feet seven inches in length, one and a quarter inches in diameter, and weighing thirteen pounds four ounces. Thinking that the

* "The Quarterly Journal of Psychological Medicine and Medical Jurisprudence," January, 1868, p. 119.

blast had been properly covered with sand, he struck it a blow with the round end of the bar, when a spark flying from the rock ignited the uncovered powder, producing an explosion which drove the tamping-iron completely through his skull. The pointed extremity entered in at the angle of the lower jaw, on the left side, passing upward and a little inward, emerging in the neighbourhood of the anterior fontanelle junction, thus passing quite through his head. In a few minutes he recovered consciousness, was put into a cart and conveyed to his residence, conversing on his way home; he then was able to walk into his house.

During the progress of the case the patient retained full command of speech, and though at times drowsy, was always rational. Recovery was perfect in about eleven weeks, but the sight of the left eye was lost. It is stated that he became very profane, never having been so before the accident. He lived twelve years and a half after this formidable injury, when, after having had several convulsions, he died.

Dr. Austin Flint, in giving an account of six cases which had fallen under his observation, expresses his strong dissent from the doctrine of the localisation of the faculty of speech in the left hemisphere, and he thinks that anatomical researches may show why lesion of speech is a more constant accompaniment of dextral than of sinistral paralysis.

In the American "Quarterly Journal of Psychological Medicine" for January, 1868, is an essay by Dr. E. C. Seguin, in which he gives a report of fifty cases of aphasia that have been treated at the New York

question, as illustrated by his own experience amongst idiots. The clinical history is concisely given of a series of cases that have fallen under Dr. Wilbur's observation during a period of twenty years, and in which there was complete or partial absence of the power of articulate language.

Of the 443 idiots he has had under his care, 121 were entirely mute—could not or did not utter a single word; 64 could say only a word or two; in 163 there was imperfect speech; and 95 are described in the register as able to speak. In these last cases, he adds, the ability to speak was commensurate, in some degree, with the intelligence; but, in a large proportion of them, there was great backwardness in learning to speak.

A large proportion, perhaps seventy-five per cent., of Dr. Wilbur's cases were congenital; the remainder had their faculties impaired by disease in infancy or early childhood. In these latter, when there was loss of speech, it occurred in some instances gradually, but more commonly instantly. He adds that intelligence, and speech or expression, have certainly not always gone with an equal step.

Dr. Wilbur gives the clinical history of his patients, with special reference to their loquelar defect; it is, however, much to be regretted that in no instance is the case completed by a post-mortem examination. I have selected the following case from Dr. Wilbur's collection, as tending to illustrate how much may be done towards partially developing speech in the idiot:—

A boy, eight years old, good-looking and well-formed, came under observation, idiocy having supervened in infancy. He looked intelligent, was very gentle and obedient; he understood any simple language addressed

to him, or spoken in his hearing ; he could repeat the sentences he heard or the question spoken, but could originate nothing in the form of speech, under any circumstances. The control over his vocal organs was complete ; he spoke quite distinctly, and with appropriate emphasis. He soon began to learn rapidly the exercises given to him, but the power or disposition to originate speech, even within the range of his wants or his affections, was wanting. The failure in the power of speech seemed to be in the absence of the proper volition. In this case, the defect was overcome at last, through reading exercises, and eventually the boy could speak spontaneously.

It may be said that imperfection of speech in the idiot is so intimately connected with a general want of intelligence, that it bears but little analogy to loss of speech as occurring in individuals of full intellectual capacity. Whilst to some extent admitting this, when I consider Dr. Wilbur's great success in developing the power of expression in the idiot, I cannot but think that if other physicians with similar opportunities to his would follow his example and place on record their own experience, a lasting benefit would be rendered to the cause of psychological science, and the solution of the particular question we are now discussing would be materially aided.

One of the most important American contributions to the literature of aphasia is that of Dr. Hammond, so well known for his able and original writings on psychiatric subjects, and for his observations and researches in the normal and pathological anatomy and histology of the nervous centres. In his classical work on Diseases

of the Nervous System, he devotes a chapter to defects of speech, which, whilst constituting an accurate record of the labours of others, is enriched by the matured experience of the writer. From the cases observed by Dr. Hammond, I have selected the following as a very remarkable and instructive one.

A retired military officer consulted Dr. Hammond in the autumn of 1869 for paralysis, vertigo, and slight difficulty of speaking, from which he had suffered for some months. Several years previously he had been under medical care for acute rheumatism, with cardiac complications. The history of the case pointed strongly to embolism, and, as the paralysis involved the right side, Dr. Hammond diagnosticated a previous attack of embolism of the left middle cerebral artery. The difficulty of speech was slight; there were both amnesic and ataxic aphasia.

Under the treatment employed he improved very much in the ability to walk, to use his arm, and to speak, so much so that his friends considered him better than he had been for several years. About six weeks after he came under Dr. Hammond's charge, he had another attack. This time the left side was paralysed, and there was no difficulty of speech. Galvanism was employed as before, and he recovered sufficiently to go to Washington city. While there he had a third attack, characterised by right hemiplegia and aphasia. He soon regained his power of speech, and shortly afterward had a further attack, involving the left side, and unattended by aphasia. He soon recovered from this, and returned to New York, when Professor Flint was requested to see him in consultation, with the special view of examining the heart, when no abnormal sounds were

detected. While in New York he had two other attacks, during both of which he was delirious; both also were characterised by hemiplegia; that of the left side was unaccompanied by aberrations of language, whilst that of the right side was attended with ataxic and amnesic aphasia; he forgot the names of the most ordinary things, and there were many words that he could not articulate at all—thus when he wanted a fan, he called it “a large flat thing to make wind with;” he also forgot Dr. Hammond’s name. He afterwards greatly improved, but had other attacks, and finally died in the autumn of 1871, presumably of cerebral softening.

It will be observed that the interesting features of this case were the concurrence of hemiplegia and ataxic and amnesic aphasia, and the striking fact that there was no aphasia when the paralysis involved the left side. According to Dr. Hammond’s views, this patient had repeated attacks of cerebral embolism. When the embolism lodged in the left middle cerebral artery, there was aphasia accompanied by right hemiplegia; when the embolus obstructed the right middle cerebral artery, here was left hemiplegia, but no aphasia.

After a full consideration of all the facts and arguments that have been urged on all sides of the question, Dr. Hammond rejects the restricted location of MM. Dax, and the still more limited area contended for by M. Broca, in reference to the seat of speech, and enumerates several interesting cases to substantiate the following conclusions:—

1st. That the organ of language is situated in both hemispheres, and in that part which is nourished by the middle cerebral artery.

2nd. That while the more frequent occurrence of right

hemiplegia, in connection with aphasia, is in great part the result of the anatomical arrangement of the arteries which favours embolism on that side, there is strong evidence to show that the left side of the brain is more intimately connected with the faculty of speech than the right.

During the last few years a considerable number of valuable psychological communications illustrating the various forms of impairment of the faculty of articulate language have emanated from the American press, amongst which I would especially mention those of Dr. E. C. Mann and Dr. Morton Prince, both of which bear evidence of much original thought and careful research.

Since the publication of my first edition, an immense number of important contributions to the pathology of aphasia have come under my notice, and I could extend this bibliographical record *ad infinitum*, but the wide range embraced by the subject I am treating compels me to limit this portion of my work to the smallest possible space; I propose, however, when dealing with the question of the causes, varieties, and treatment of aphasia, to illustrate my remarks by reference to various other interesting cases that have fallen under my observation, and which could not be included in this bibliographical sketch.

CHAPTER IV.

AUTHOR'S OWN CLINICAL EXPERIENCE.

“Segnius irritant animos demissa per aurem,
Quam quæ sunt oculis subjecta fidelibus, et quæ
Ipse sibi tradit spectator.”

HAVING in the preceding pages endeavoured critically to review the question of the localisation of the faculty of speech, as illustrated by the labours of the French, Dutch, and German pathologists, as well as by those of the different branches of the Anglo-Saxon race, I now proceed to place on record a certain number of cases which have been observed by myself, and in several of which the clinical history was completed by a careful *post-mortem* examination.

In some instances it may be thought that I have described the clinical history with too much minuteness, and with a fastidious attention to apparently unimportant details; but the question we are now considering is involved in so much obscurity, that it seems to me that it is only by carefully studying the various phases of cases which we have an opportunity of closely watching, that we can hope to contribute anything towards the solution of one of the most complex questions in cerebral pathology—a question about which so much has lately been written, and about which, it seems to me, so little is at present really known.

It will be observed that in several of my cases I have given the volumetric analysis of the principal solid ingredients of the urine. This, to some persons, may seem a work of supererogation; to those I would say that the diagnosis of cerebral disease is in many instances attended with so much difficulty, that the serious and conscientious observer is bound to avail himself of every collateral aid within his reach; the metabolism of the various tissues of which the animal body is composed, which occurs during life, is accompanied by the formation of certain products which require to be removed, and it cannot be otherwise than useful, systematically to calculate the amount of phosphorus and other constant or occasional solid ingredients of nervous tissue which are daily eliminated from the system, for the presence, in greater or less quantities, of these substances in the animal economy, and their morbid manifestations, are subjects of deep interest to the practical physician.

The following cases present various degrees of the affection, from the uncomplicated pure form of aphasia—where there is simply abolition or suspension of speech without any paralytic or other morbid symptom—to the partial or even occasional impairment of that faculty; and here I would remark that in making investigations with the view of elucidating any obscure symptom or disease, the common error into which many observers fall, is to confine their attention to the consideration of typical cases only—cases where the symptom or disease is well marked and defined; whereas, as much or more information may sometimes be gained from the careful study of exceptional cases, and of cases where the particular symptom or disease is only slightly marked.

Impressed with these views, I have for some time past made careful notes of all cases that have fallen under my observation, where the faculty of articulate language was affected in any way or degree, however slight, deeming it quite as useful to study cases where the lesion of speech is a mere epiphenomenon, as where it forms the principal or the sole morbid symptom.

CASE I.—APHASIA OF THE ATAXIC FORM, OCCURRING AS THE EARLIEST MORBID SYMPTOM; SOME MONTHS LATER VERBAL AMNESIA; EPILEPTIFORM CONVULSIONS; ULTIMATELY GENERAL PARALYSIS. AUTOPSY — CIRCUMSCRIBED SOFTENING IN BOTH POSTERIOR LOBES; FRONTAL CONVOLUTIONS UNAFFECTED.

William Sainty, a waterman, aged fifty-one, was admitted under my care into the Norfolk and Norwich Hospital, April 1st, 1865, with the following antecedent history:—He had always lived a temperate and steady life, had never contracted syphilis, nor suffered from any rheumatic affection—in fact, he had always enjoyed excellent health quite up to the period of the present attack, which was not preceded by any premonitory symptoms of brain or nervous disorder.

On the 9th of December, 1864, after unloading his vessel, in which he had conveyed a cargo of goods from Norwich to Yarmouth, a distance of thirty miles, he went into a tavern with the intention of asking for some beer, when to his astonishment and concern, he found he could not speak—the power of articulation was suddenly and completely suspended. Nothing odd or peculiar had been observed in his manner, and he had only a few hours previously called at a merchant's office and arranged about a fresh cargo, when his aptitude for business was in no wise impaired. The loss of speech then was sudden, and was clearly

unaccompanied by any other paralytic symptom, for although speechless, he, on the same evening, removed his vessel from one point of the river to another, and on the following day loaded it with a fresh cargo, after which, unaccompanied by any of his friends or comrades, he took the train to Norwich, and on his arrival walked from the railway station to his own home, a distance of a mile. His friends, alarmed at finding that his vocabulary was limited to the words "Oh! dear! oh! dear!" sent for a surgeon, under whose care he continued till a few days before he came to the hospital.

I have not been able to procure any very accurate information as to the precise time during which the abolition of speech was complete; it would seem, however, that after three days he could say a few words, but that it was not till the expiration of a fortnight that there was any marked improvement; after this period the progress towards the partial recovery of his speech seems to have been gradual. Some time in February he experienced a slight abnormal nervous symptom, characterised by numbness in one of the fingers of the right hand. A month later he had a kind of fit, falling down, and remaining for a few minutes unconscious.

Symptoms on Admission.—His condition is that of a healthy-looking man, with a remarkably intelligent countenance, looking me straight in the face when addressed, and evidently understanding all that is said; but although his ideas seem to arise in great number in his brain, and there is no want of sequence in his thoughts, he is unable to give expression to those ideas by articulate language, except in a very imperfect manner. There is, also, partial agraphia, for although just able to form one or two words, he cannot write a sentence, he being able to write fluently and well before the present attack. He has the proper use of all his limbs, which are free from the slightest abnormal sensation. The peripheral instruments of language are unaffected; the tongue is protruded straight, and he can execute all the different movements appertaining to that organ. The only feature to notice in the tongue is, that the right half is slightly raised above the level of the left half, and is more flabby, and also that when told to protrude the tongue, he keeps it out a long time, as if from a defect of memory, probably not remembering what he had done; the power of deglutition also is unaffected. There is no abnormal sensation about

the head, and the organs of special sense are unimpaired. He is very cheerful, and does not weep from emotional causes, like persons with ordinary paralysis; nor has he that distressed countenance usually observed in the subjects of grave cerebral disorder; in fact, there is nothing in his appearance to denote the disorder with which he is troubled. The heart's action is feeble, with occasional intermittence, but no evidence of valvular disease. Pulse, 72. Urine, sp. gr. 1020, freely acid; no albumen; and a volumetric analysis of the principal solid ingredients gave the following result:—

Chlorides	-	-	-	-	10.5	parts per 1000
Urea	-	-	-	-	26	„ „
Phosphoric acid (in combination)	1.5	„	„			„ „

So long a time having elapsed since the attack which had produced the impairment of speech, I felt that but little could be done in the way of treatment. I prescribed for him small doses of the phosphates of iron and zinc, with dilute phosphoric acid, and under this treatment, together with a careful attention to diet, he slightly improved, the improvement being, however, more marked in his power of writing than in speaking. Discharged June 3rd.

Shortly after his discharge he resumed his work as a waterman, when no untoward symptom occurred till January, 1866, when, after a morning's work, as he was going into his cabin to prepare for dinner, he fell to the ground quite unconscious, and came to himself in about a quarter of an hour; but his speech for some hours was more embarrassed than usual; there was, however, no paralysis on recovery, for he resumed his work the same day. At the end of February (a month later) he again fell in his cabin, frothed at the mouth, was livid in the face, and remained unconscious half an hour; on recovery, there was increased embarrassment of speech for some hours, but before night he was as usual. There seems to have been no convulsive movements on either of these two occasions. After the above date he had a similar fit every few weeks.

Re-admitted January 12th, 1867.—He seems still in possession of all his intelligence, has no paralysis, nor even diminution of motor power. He understands all that is said, but is affected with an incapacity to employ substantives, having lost the memory of words

as far as that part of speech is concerned, and he will make use of a periphrase to avoid using the substantive required. He has very clear ideas as to what he wishes to say, is aware that he is wrong in the use of words, is vexed at his blunders, and is ingenious in contriving means to counteract or avoid them. If asked to fetch an object, he will bring the right, but if he wants anybody else to fetch or give him anything, he more commonly asks for the wrong thing first, afterwards correcting himself, showing that he understands perfectly what he wants. If shown anything, he will say that he knows what it is, but cannot say it. On being shown a purse, and being asked what it was, he answered, "I can't say the word ; I know what it is ; it is to put money in," "Is it a knife?" "No." "An umbrella?" "No." "A purse?" "Yes." I showed him a poker. "What is it?" "I know, but I cannot say the word." "What is its use?" "To make up the fire." "Is it a walking stick?" "No." "Is it a broom?" "No." "Is it a poker?" "Yes," he said, instantly, with a smile evincing complete understanding of the question, and joy at the certainty that he had answered it right. It was evident, therefore, that the words representing his ideas were preserved in the treasury of his memory, but the mere origination of the ideas was not sufficient to effect the verbal expression of them ; it was necessary that the process should be aided by the patient hearing the required words pronounced by another person.

March 30th.—The house surgeon was called to him to-day, and found him stretched on the floor, twitching convulsively, with turgid face, gnashing of the teeth, foaming at the mouth, eyes open and rolling, pupils dilated and insensible to light, breathing stertorous, skin cold and clammy. These symptoms continued for fifteen minutes, when violent jerking of the left leg and thigh occurred, the convulsive efforts ceased, and he gradually recovered his senses ; there was no paralysis.

March 31st. The patient had a sound sleep after the fit of yesterday, and to-day is as usual.

On showing him a tumbler glass he shakes his head, and says it is for beer, but cannot remember its name ; he knows it is not called a basin, a mug, or a jug, and recognises the word "glass" directly it is named ; but the next minute he has forgotten it, and cannot repeat it. He was also shown a warming pan, about which he became quite angry from his inability to remember its name ; he, however,

showed his interrogators what it was used for, with great despatch, and recognised its name the moment it was casually mentioned.

April 24th.—Suddenly taken speechless, with loss of motor power in the lower limbs, the upper extremities being unaffected. The fit was evidently entirely different from any other he has had; there were no epileptiform convulsions; simply faintness, speechlessness, and paraplegia. The pupils were equal and active; he appeared conscious of all that was going on around him, and as soon as he was put to bed he uttered confused sounds, but could not articulate.

25th.—The motor power in the lower limbs has partially returned; in fact, there is no actual paralysis this morning, there is simply want of co-ordinating power of the lower limbs; he can walk very imperfectly, supported by two persons, but cannot stand alone.

May 2nd. I was summoned to him to-day, and found him in an epileptic fit, perfectly unconscious, pupils both contracted and immovable, foaming at the mouth, with convulsions, which were confined to the right arm and leg and right side of the face; the right orbicularis palpebrarum was contracting violently; the left side of the body seemed unaffected; the convulsions soon affected both sides, the left, however, to a much less extent. Five grains of calomel to be put upon the tongue, and a turpentine injection to be administered.

3rd.—He is still quite unconscious—in fact, in a state of epileptic coma; pupils still contracted, and immovable, and there is imperfect right hemiplegia, without loss of sensation.

4th.—The hemiplegia has passed off, there being only a little less power in the arm; consciousness is returning.

5th.—Pupils still contracted and insensible to light; he has recovered consciousness, and has evidently now the use of all his limbs. He cannot stand alone, but he walked some yards this morning, with the assistance of two persons. He puts his hand to his forehead as if in pain, and he is becoming restless, and requires a person constantly by his side to keep him in his bed.

In a few days he had gradually recovered the power to stand and even walk alone a few steps; he continued, however, quite unable to speak, although he would make certain sounds intended to convey his thoughts. It was soon found that his moral passions had undergone a change, and that from a particularly quiet, modest, and well-behaved, inoffensive man, he had become indecent, exposing his

person, revengeful, and spiteful. His mind soon gave way, he became imbecile and quite unmanageable, and it was soon found necessary to remove him to the Borough Asylum.

1868, *July 9th*.—I visited him to-day at the Asylum, and found him seated on a bench. He evidently recognised me, but was quite unable to speak a single word, and he evinced the greatest distress at his inability to converse with me. He had gained flesh, and looked well. Mr. Sutton, the resident medical officer, reported to me that about four months ago he had a series of epileptiform convulsions lasting forty-eight hours, and that he was, to all appearance, dying; he, however, soon recovered from this condition, but continued very helpless and unable to walk or even stand without assistance, although when supported by two persons he could walk a considerable distance. Mr. Sutton further reported that although unable to articulate, he gesticulates frightfully, and thus endeavours by the language of signs to supply the loss of articulate language. In further illustration of his psychological condition, I would add that his sister informs me that some months since, upon the occasion of his nephew playing the cornet in his presence, he, supported by two women, danced to the tune.

Soon after my visit to the Asylum, this patient died from exhaustion after another epileptiform seizure, of a similar kind to those described above.

Autopsy.—The cranium was somewhat thickened; the dura mater much more so. Intense congestion of the convex surface of the hemispheres, decidedly more marked on the left side; considerable opacity of the arachnoid, also more apparent on the left side. A little flattening of the convex surface of the left anterior lobe. In the middle of the left posterior lobe was an area of softening of about the size of an apricot; a similar condition existed also at the same spot in the right hemisphere, but the softening was not so far advanced. The frontal convolutions were especially examined, but no trace of softening or other disease was discovered; the central ganglia, pons, and cerebellum were also healthy. There was a want of firmness in the brain generally, but no appearance of hemispheric

disease elsewhere than as above stated, although various portions were submitted to a careful microscopic examination. All the arteries of the base of the brain were atheromatous ; the left middle cerebral was completely filled by a fibrinous plug, and the left vertebral contained a small thin red filiform fibrinous cast, occupying only about a quarter of the diameter of the vessel. The heart weighed 11 ounces ; the left ventricle was hypertrophied. There was narrowing of the mitral valve, with considerable atheroma at its base, as also at the base of the aortic valves. Considerable dilatation of the tricuspid orifice, with slight thickening of the valve itself. The weight of the encephalon, stripped of dura mater, was 47 ounces.

The above case seems to me to be pregnant with material for careful thought and study, and if I have dwelt thus minutely on its daily progress, it is because I apprehend that it is not common to have the opportunity of watching for so long a time a patient presenting such an exceptional chain of symptoms. I shall now proceed to analyse the various phases which the clinical history of this man has from time to time presented.

The sequence of disordered action here is curious. The very first morbid symptom was total loss of speech; after partial recovery of the faculty of speech, verbal amnesia was observed—loss of the memory of words limited to substantives ; the idea was present, but the word was wanting ; the idea rose up in his mind, but the accompanying word-image was wanting ; the association between the word and the idea was interrupted, although articulation was at the service of the word, for the word immediately emerged, and could be correctly uttered, as soon as it was either spoken or read before the patient ; then epileptiform convulsions set in, and, alternating with each other, hemiplegia and paraplegia ; and eventually this curious

chain of morbid symptoms merged into a state of general paralysis.

The loss of speech was, in the first instance, of the ataxic form, for no amount of prompting would help him. As the abolition of speech was complete, it is, however, impossible to say whether or not there was at this time verbal amnesia also. Probably there was, for when the ataxic symptoms gave way, loss of the memory of words was soon observed. Dr. William Ogle* mentions two cases in which, after recovery from the ataxic form of aphasia, amnemonia remained, which he thinks must have co-existed at the earlier stage with the ataxia; in both Dr. Ogle's cases, however, there was hemiplegia, indicating a much more extensive lesion of brain than could have been suspected at this stage of Sainty's history.

The next feature to which I wish to call attention is, that not only was the total loss of speech the earliest symptom, but it was for some days the sole symptom. There was no paralysis—there was simply privation of the power of speech; it was simple aphasia, in the rigorous sense of the term—and cases such as this would seem to show that the faculty of speech may perish, or be suspended, *alone*, and that this faculty is special and independent.

The muscular apparatus, which served for the articulation of words, was in a perfect state of integrity, but an indispensable element was wanting; the vocal instrument was intact, but the artist was unable to make use of it.

* "On Aphasia and Agraphia." "St. George's Hosp. Reports," vol. ii., 1867. This interesting and highly instructive communication contains the careful analysis of 25 cases, which have furnished Dr. Ogle with the material for one of the most useful papers that have been published on this subject.

When the aphasia had assumed the amnesic form, the defect was dependent on loss of the memory of words ; but in the earlier stage, when the ataxic form was present, was the defect due to the loss of the memory of the movements necessary for speech ?

The complete but temporary loss of speech in the early stage, I presume, was the result of a simple ephemeral cerebral congestion, probably situated in the same part of the brain as that, which, being subsequently more seriously injured, gave rise to the more permanent symptoms.

The occurrence of paraplegic symptoms after one fit, and of hemiplegic symptoms after another, is worthy of notice. I will not attempt to offer any theoretical speculation as to the cause of the temporary loss of motor power in the lower limbs ; I simply notice it as singular and exceptional. The transitory hemiplegia, I presume, can be explained on the supposition of temporary obstruction, or rather spasm of the middle cerebral artery, and the term *hemispasm*, as suggested by Dr. Hughlings Jackson, would be more appropriate to such a condition than *hemiplegia*.

I wish to call particular attention to the fact that the lesion which could produce total abolition of speech for a considerable time, did not in the least impair the intellect, for when he came under my care some months afterwards, he seemed possessed of more intelligence than most men of his class ; he had plenty of ideas, the defect was the inability to clothe the ideas with the proper symbols necessary to convey them. I may here remark that the opinion of those who have written upon this subject is divided, as to whether the intelligence, is, as a rule, affected in aphasia. Trousseau held the opinion that the

mental faculties were always more or less impaired ; on the other hand, the case of Professor Lordat has been cited as a proof that the aphasic condition may exist with the highest amount of intellectual activity. It seems that the illustrious Montpellier professor was at a certain period of his life affected with aphasia, and he has himself stated that, although speechless, he experienced no restraint or difficulty in the exercise of thought and imagination. He prepared his lessons, he arranged his subject, and was able mentally to dwell on the salient points. "*Je possédais complètement," dit-il, "la partie interne du langage, je n'en avais perdu que la partie externe."*

The question has arisen in my own mind, as to whether, during the early part of Sainty's illness, he was capable of making a will. The testamentary capacity of aphasics is an important medico-legal question, which I purpose considering in a subsequent chapter.

CASE II.—AMNESIC APHASIA, WITH RIGHT HEMIPLEGIA. AUTOPSY—SOFTENING OF THE POSTERIOR PART OF THE LEFT HEMISPHERE; ANTERIOR LOBES HEALTHY.

On the 20th of March, 1867, I was requested to see Mr. N—, a merchant, æt. 51, with no hereditary antecedents of mental or nervous disease in his family, who, for a period of three or four months, had experienced abnormal symptoms, indicating want of brain power. For some time previous to this date his friends noticed that he had become unusually quiet, less communicative, and dull. Shortly before Christmas, he had a sort of fainting fit, and soon afterwards he began to get confused in his conversation ; he would let objects drop from his right hand, and do awkward things at the table—on one occasion he put vinegar on his repast instead of pepper. It

was soon observed that he could not write a letter. From inquiries which I instituted in reference to his habits, it seems that he had led a fairly temperate and steady life, and that the only cause which could be assigned was the excitement and mental tension resulting from an entire change of occupation; he having a few years previously exchanged the comparatively mechanical and automatic life of a country village, for a business of a speculating character in a large town, necessitating railway journeys to London twice a week. I ought to add, however, that within a comparatively recent date he had accidentally received a severe blow on the head.

During my somewhat lengthened interview with him, he never initiated any subject of conversation. When I questioned him, he seemed to get confused, and was conscious of this confusion, saying he could not find words to describe his symptoms. What answers he made, however, were given quite coherently, but in the fewest possible words. He seemed to understand everything that was said, but he had, to a certain extent, lost the memory of words, and would call things by their wrong names—for instance, being in a room where the fire was burning particularly brightly, he said, "How bright the poker looks." The person to whom he was speaking, said, "You mean the fire." "Yes," he said, "I mean the fire." He would be thus confused in the choice of words to express his thoughts, and the knowledge of this defect was a source of distress to him. The idea was conceived, but the means of communication with the external world did not exist. He complained of numbness in the right arm and leg, and the tactile power of the right hand was impaired. The heart's impulse was feeble, with no abnormal sound; the pupils were sluggish, and he complained of frequent dizziness and of frontal headache. His pale and pasty aspect, diminished secretion of urine, and other symptoms caused me to deem it necessary to look carefully into the condition of the kidneys.

The analysis of the urine gave the following results:—quantity passed in 24 hours, 26 ounces, sp. gr. 1030, no albumen, some pale lithates. A microscopic examination revealed the presence of amorphous lithates, a few oxalates, and several oil globules and fat cells.

Chlorides - - - - -	4	parts per 1000
Urea - - - - -	16	„ „
Phosphoric acid, in combination -	3'2	„ „

The condition of this patient was not materially altered for some weeks, when, after dressing himself one morning, he was profusely sick, and his symptoms suddenly culminated into an apoplectiform seizure, with right hemiplegia and total loss of speech, the latter symptom being the result of a state of coma, from which he never rallied.

Autopsy.—There was considerable congestion of the veins on the convex surface of the brain, but there was no opacity of membranes or other morbid appearance, either on the upper surface or at the base. The vessels composing the circle of Willis, and the arteries generally, were quite healthy, both middle cerebral arteries being specially examined and traced along the fissure of Sylvius, without any abnormal appearance being detected. At the point of union of the middle third with the posterior third of the convex surface of the left hemisphere, was a dilatation, or bulging out of the arachnoid, giving the appearance of a cyst. This contained at least two drachms of serum, the evacuation of which disclosed a tolerably well circumscribed portion of softened cerebral tissue, of about the size and shape of an apricot, with its upper segment depressed, so as to form a cup-shaped cavity. It was here the serum was lodged, and there was at this spot an actual destruction of cerebral matter; the softened tissue was of a yellowish grey colour, resembling a strong solution of gelatine in appearance. In the centre of this softened portion was a very small clot, or rather layer, of black blood, of about the size of an ordinary wafer. From the small size of the clot, and the great extent of the softening, it must be inferred that the softening preceded, and was the cause of the clot, and the recent date of the sanguineous effusion would also favour this view. The frontal convolutions were examined with great care, especially the third, and the substance between it and the corpus striatum, but these structures were found quite healthy. The disease was, in fact, limited to the posterior third of the left hemisphere.

The heart was covered with an unusual layer of external fat; its muscular substance was pale and flabby, and its walls attenuated. The kidneys were healthy, but congested, and somewhat below the normal size. The spleen was very soft and friable.

Doubtless it will be said by some that this is scarcely a case of aphasia. It is certainly by no means a typical

instance of the affection, like the preceding case ; but as I am treating of lesion as well as of loss of speech, I think it deserves recording as an instance of the loss of the memory of words and impairment of the faculty of language, dependent upon softening of the posterior part of the left hemisphere, with perfect integrity of the frontal convolutions and of the anterior lobe generally. In the former part of this essay, I have already cited a case of Abercrombie, somewhat resembling this, and where the softening was also found in the *posterior* part of the left hemisphere.

CASE III. — RIGHT AND SUBSEQUENTLY LEFT HEMIPLEGIA, WITH LESION OF SPEECH ; EFFECTS OF ELECTRICITY. AUTOPSY—HÆMORRHAGE INTO THE CENTRAL PART OF EACH HEMISPHERE ; FRONTAL CONVOLUTIONS SOUND.

John Sutherland, a shoemaker, aged 60, was admitted into the Norfolk and Norwich Hospital, December 22nd, 1866, with the following history. He had not been a drinking man, had smoked very little, had suffered from gonorrhœa, but had never had syphilis or rheumatic fever. Whilst at work on September 4th, he suddenly lost the entire use of his right side, and also of his speech. The loss of articulate language was almost complete for about a fortnight, at the expiration of which time he could just make himself understood by those who knew him well ; the partial recovery of his speech coincided with a little returning motor power in the leg, but it was not till two months later that there was any improvement in the hand.

Condition on Admission.—There is still considerable loss of power in the right arm, and the fore-arm is contracted on the arm he walks with difficulty, but there is less impairment in the use of the leg than of the arm.

The memory and intellect are unaffected ; he answers questions remarkably readily, and there is now no hesitation in his speech, but he speaks in a muffled, unnatural tone, as if the mouth was full. There is no evidence of cardiac disease, no unilateral sweating ; he fancies he cannot smell as well as before the attack.

There was nothing in the treatment of this case to record, except that, some weeks after his admission, galvanism was twice applied to the right leg, but this seemed to aggravate his condition, for in a few days there was complete paralysis of this limb.

Some days later he had a severe apoplectic seizure, resulting in paralysis of the entire *left* side, with great difficulty of speech, and he died in a few days.

A most careful *post-mortem* examination was made, which I will not describe in detail ; suffice it to say that the loss of motor power on the two sides was explained by a clot in the central part of each hemisphere ; there was no obstruction of the middle cerebral arteries, and we clearly satisfied ourselves that the frontal convolutions were in no wise affected.

Independently of the integrity of the frontal convolutions, there are one or two other points in this case calling for a passing remark. It will be observed that galvanism caused a decided aggravation in his symptoms. This powerful remedial agent cannot be used with too great caution and discrimination in cases of paralysis, and I take blame to myself for having allowed its use here ; for the contracted state of the forearm was indicative of a state of irritation and of exalted polarity of the nervous tissues, likely to be aggravated by electrical stimulus.

Although the increase of the dextral paralysis was unaccompanied by any fresh aphasic symptoms, it will be observed that the occurrence of left hemiplegia coincided with great difficulty of speech. Those who view cases partially and distort them to suit their own notions, would, in a statistical table, put this down as a case of

left hemiplegia with aphasia; whereas it is evident that the difficulty in speaking which occurred during the last few days of his life, was due to a semi-comatose condition, induced by sudden cerebral hæmorrhage, and which rapidly ended in death. I have recorded his fancied loss of smell, because I think it important in all cases to notice the state of the olfactory function.

CASE IV.—APHASIA, WITH RIGHT HEMIPLEGIA.
AUTOPSY—BONY DEPOSIT IN THE LEFT MIDDLE CEREBRAL FOSSA; NO LESION OF FRONTAL CONVOLUTIONS.

The subject of this case, Mr. C. G—, was a gentleman, aged 36, who had led a very gay life, and who had on several occasions been affected with a severe form of venereal disease; he had also suffered from rheumatic fever. For many years he had been at times the subject of great mental excitement, and even to some extent of mental delusions. There was no hereditary predisposition to insanity in his family, but two of his brothers were affected with paralysis of the right side, the paralysis being in one of them attended with considerable impairment of speech.

In the year 1865 he entered into the married state, and, four months afterwards, his habitually excited condition much increased, and it became necessary to place him in an asylum. He now soon began to hesitate in his speech, and to give evidence of the loss of the memory of words; his power of writing also became impaired. Some months later he was suddenly attacked with convulsions, followed by right hemiplegia, with total loss of speech, and he died in a few days.

I was invited by his medical attendant to be present at the autopsy, when there was found evidence of chronic thickening of the arachnoid, with congestion of the pia mater of the left side especially; there was no clot, no degeneration of cerebral matter; the anterior convolutions were especially examined, and found quite

healthy. The most remarkable appearance that this examination disclosed, was a deposit of rough bony matter—exostosis, at the centre of the fossa corresponding to the middle lobe of the brain on the left side, and to this rough surface the cerebral membranes were slightly adherent.

In the absence of any more decided cause, I presume the diseased condition of bone might account for the convulsions; but the case is curious from the fact of the hemiplegia being so decided without any disease of the central ganglia or of the hemispheres. The *fons et origo mali* was undoubtedly the syphilitic taint. The occurrence of dextral paralysis, with dysphasia, in his brother, is just worthy of observation; in the account of Dr. Scoresby Jackson's remarkable case, it is stated that another member of the same family was affected with lesion of speech and paralysis of the right side.*

In reference to the subject under discussion, I wish more particularly to call attention to the fact that this and the two preceding cases may be considered as directly opposed to Professor Broca's theory; in all three the frontal convolutions were examined with a scrupulous care, and were found quite healthy, and in the case of Mr. N.—, which was a marked instance of the amnesic form of aphasia, the lesion was not near the anterior lobe at all, being situated at the posterior part of the upper surface of the hemisphere. With every desire to avoid the common error of drawing definite conclusions from a limited number of observations, I would add that three negative cases, supported by *post-mortem* verification, go

* Dr. Sumpter, of Cley, has recorded in the "Lancet," of October 3rd, 1868, a brief note of two cases of Aphasia then under his care, in which the patients stood in the relation to each other of mother and daughter.

far to outweigh three hundred cases, apparently admitting of a different interpretation, but where no autopsy was made.

It is somewhat singular that in each of the above three cases there existed an abnormal condition of the left side of the base of the skull. In one case, as above stated (Mr. C. G.), there was actual *disease* of bone; in the case of Mr. N.— there was an unusual development of that part of the petrous portion of the left temporal, which corresponds to the perpendicular semi-circular canal; and in Sutherland's case there was a remarkable bony prominence in the left middle fossa, not existing on the other side. It will doubtless be said that unsymmetrical development of the two sides of the skull is not uncommon. I quite admit this, and I desire simply to record what I have observed, without attempting to draw any inference from such observation. I cannot but think, however, that it would be extremely desirable, in future autopsies of persons who during life exhibited symptoms of lesion of speech, that the condition of the bones of the skull should be minutely examined, and any unusual appearances accurately recorded.

CASE V.—LOSS OF SPEECH OF AN INTERMITTENT CHARACTER, WITH PARAPLEGIA; SPINAL SYMPTOMS.

George Green, a shoemaker, æt. 38, was admitted into the Norfolk and Norwich Hospital on February 10th, 1866. He had been affected with syphilis, but never suffered from any rheumatic affection. His first symptom was pain in the forehead and dimness of vision, for which he was treated as an out-patient at University College Hospital in the early part of 1864; up to this period he had been a most inveterate smoker, which habit he at once discontinued, at the request of Dr. Wilson Fox.

During the summer of 1864, whilst at work, he suddenly lost the power of speech, there being at the same time an aggravation of the habitual frontal pain, but no symptom of paralysis, and he resumed his work next day. The total cessation of speech lasted about twenty minutes or half an hour, when the only symptom in connection with the power of speech, was a slight hesitation and embarrassment which lasted three or four days, and then as far as his speech was concerned, he was as well as ever. In about three weeks after the above symptoms, he was obliged to discontinue his work in consequence of being seized with a tingling feeling, running from the extremities of the right fingers, along the arm to the top of the shoulder, and up to the right angle of the mouth; there was evidently partial paralysis, as he could not hold anything, and there seems to have been anæsthesia, as he speaks of numbness and loss of feeling; the paralytic symptoms were entirely confined to the right upper extremity. These symptoms disappeared in about two hours, and he resumed his work, no treatment having been adopted.

About January, 1865, he began to feel a tired sensation in his legs, as if he had been walking a long distance; at the same time he noticed some difficulty in passing his water, and an habitual constipation began to increase. Six months later he again lost his speech whilst reading, the loss of the power of utterance being preceded by a swimminess in the head and dimness of vision: he went to bed, fell asleep, and after three hours woke with the speech restored, but only a little embarrassed; the next day all was right. He has never had dysphagia, and when the power of speaking has been suspended, the movements of the tongue have been unimpaired.

Symptoms on admission.—He is quite unable to stand or walk without assistance; there is no deviation of, or pain on pressure over the spine, except slightly at the neighbourhood of the lower dorsal vertebræ; there is no paralysis of the upper extremities, and the organs of special sense are unimpaired. The tongue is furred, the bowels are constipated, rarely acting more than once a week; there is difficulty in passing his water, but only at night when in the recumbent posture. There is no evidence of cardiac disease.

In the absence of any positive therapeutic indication, and with the possibility of his symptoms being due to a remote syphilitic

cause, I prescribed small doses of perchloride of mercury, and a cathartic electuary at bedtime.

March 26th.—For several days has not felt so well, has had but very little sleep; had an attack yesterday similar to his former ones, but much slighter in degree—the speech was affected for about two hours, but much less so than on former occasions. He attributes his relapse to want of sleep; he complains to-day of tingling and numbness in the left little finger, which has been present for four or five days.

He derived some slight benefit from treatment, and left the hospital on the 12th of May. Thinking this a case in which it was very desirable to ascertain in what proportions the principal solid ingredients of the urine were present, I made a careful volumetric analysis of that secretion a few days before his discharge, with the following result:—

Chlorides	-	-	-	-	7.5	parts	per	1000
Urea	-	-	-	-	17	"	"	
Phosphoric acid (in combination)	1.1	"	"					

Quantity passed in 24 hours, four pints, sp. gr. 1014; reaction, alkaline.

Re-admitted December 1st.—Omitting unimportant details, I pass on to January 19th, 1867, when I find the following entry:—He awoke in the middle of last night, and found that he had lost his speech, this phenomenon being preceded by violent pains in both brows, just above the external angular process. He feels the pain in his forehead to-day, but the speech is now all right.

22nd.—He has vomited some bilious matter, and had early this morning a tingling up the right arm up to the side of the mouth.

February 16th.—No marked difference in his symptoms since admission, except that there is now rather sharp pain caused by pressure over the 8th and 9th dorsal vertebræ, and from this spot downwards; for some weeks past also there has been pain at this region when not touched. This patient soon afterwards left the hospital, and I heard nothing more of him, till his father came one day to say he had died quite suddenly. I regret I was not permitted to make a *post-mortem* examination.

The history of this patient is suggestive of the caution with which we should accept any statistics based upon cases only casually observed, or which have been under observation but a short time. Had this case been reported in its early stage, when there were abnormal symptoms present in the right upper extremity, it would perhaps have been recorded by some enthusiastic aphasiographer, as a case of aphasia with imperfect right hemiplegia, and it would thus have been cited with others to prove the correctness of Dax's theory; whereas, as time elapsed and other links were added to the morbid chain, paraplegia set in, and in fact there never was really any persistent paralysis of the upper extremities.

I do not wish to indulge in any hypothetical speculations as to the seat of this man's disorder. There was never any permanent symptom pointing directly to cerebral disease; whereas the persistent paraplegia and loss of function of the bladder and rectum, together latterly with tenderness and pain at the lower part of the spine, justified me in looking upon his symptoms as due to disease of an insidious nature in the spinal cord.

I have already mentioned, in a former part of this treatise, a case reported by Dr. Maty, in which impairment of speech was one of the symptoms of spinal disease, and Abercrombie* has related three cases in which lesion of speech was accompanied by spinal symptoms; in the first of these there was found after death suppuration between the cord and its membranes, the brain being perfectly healthy; in the second case, no disease whatever was found either in the brain or spinal cord, or in the bones of the spine, although the symptoms during life were

* "On Disease of the Brain and Spinal Cord," pp. 333, 356, 410.

those ordinarily indicative of spinal disease ; in the third case there was undefined suppuration of the cord.

CASE V.—ATAXIC APHASIA OCCURRING AS A CLIMACTERIC SYMPTOM.

Anna Maria Moore, aged 47, a labourer's wife, of a strongly marked nervous temperament, came under my observation as an out-patient of the hospital on November 9th, 1867.

She was the mother of ten children, and miscarried two years previously, had never enjoyed her usual health since, and menstruation from that time had always been irregular and too frequent, and she felt a constant pain in the lower part of the back.

In February she had a severe sore throat, with ulceration of the tongue and of the mucous membrane of the cheek ; and during this attack she lost the power of speaking for three days. Her speech continued all right till June, when the throat became similarly affected as in February, but to a less extent, and she again lost her speech. This time, however, the defect was not of a transitory character, as on the former occasion, for it continued up to the time of her admission into the out-patient department of the hospital.

On my asking her what ailed her, she could not make herself understood ; she seemed, however, to understand perfectly what I said to her ; and there was an attempt to talk, resulting in a nervous, unintelligible stutter. She seemed to have the proper use of her tongue, which was protruded straight ; deglutition and phonation were unimpaired ; there was no paralysis of limbs, nor abnormal sensation in the same. At the expiration of a week, finding there was no return of the power of speech, she became an in-patient in the hospital.

November 11th (two days after admission).—At my visit to-day, to my astonishment, she addressed me quite naturally. On making inquiries, I ascertained that when first admitted into the ward nobody could understand her ; on getting up the next day she found she could speak better ; the improvement continued during the day, and this morning she speaks as well as ever.

November 23rd.—No return of her inability to speak having occurred, she was this day made out-patient.

1886. *July 1st.*—Presented herself at the hospital to-day. The speech is impaired; she is, however, menstruating, and she says her speech is always more embarrassed at the period of menstruation.

June 29th.—Speech very bad to-day; can only express herself with the greatest difficulty. Menstruation, which should have begun some days since, has not yet occurred.

February 12th.—Menstruation still deferred. For a period of three days, since her last visit, she could scarcely speak at all.

Without dwelling on the further details of this case, I would merely observe that the urinary secretion varied considerably in quantity, and she seldom passed a fortnight without what she called “a stoppage”—evidently an attack of painful micturition, with partial suppression. It seemed desirable to make a volumetric analysis of the urine, which gave the following result as to the principal solid ingredients:—

Chlorides	-	-	-	7 parts per 1,000
Urea	-	-	-	19 „
Phosphoric acid in combination	-	-	-	1.8 „

Quantity passed in 24 hours $3\frac{1}{4}$ pints, sp. gr. 1020, freely acid, no albumen. In reference to the treatment of this case, I found diffusive stimulants of service, and she subsequently derived considerable benefit from the bromide of potassium.

On analysing this patient's symptoms, it is clear that the defect of the speech was ataxic, for no amount of prompting could assist her in the least; there was no amnesia. What was wanted was not the word, but the recollection of the process by which to give it utterance.

I do not apprehend that the faculty of language was impaired in its intimate seat, for she was in no wise deprived of ideas necessary to serve as a pabulum for language, but there was suspension of the power of co-

ordination necessary to the production of speech. I presume the embarrassment of speech was due to what M. Auguste Voisin* calls, "*l'interruption plus ou moins complète de l'incitation volontaire*," or, to use the words of Todd, "There did not exist that relation between the centre of volition and that of intellectual action which is necessary to give expression to the thoughts in suitable language; the centre of intellectual action had full power to frame the thoughts, but as the will was not prompted to a certain mode of sustained action, the organs of speech could not be properly brought into play."

The fact of the dysphasia being aggravated at the menstrual periods is worthy of notice. It first occurred after a menorrhagic flux, and the whole morbid chain of symptoms may be considered as climacteric. M. Delasiauve has cited the case of a lady who for three years, at each menstrual period, was affected with mutism and partial paraplegia, being at those times only able to make herself understood by signs.†

Another interesting feature in this case to which I would call attention, without, however, drawing any inference from it, is—that the lesion of speech first occurred after a severe attack of sore throat. I regret I have not been able to ascertain whether the throat affection was of a diphtheritic character, but the coincidence of the two symptoms is deserving of notice.

It may, perhaps, be said that cases like the above are

* This accomplished alienist physician, to whom I am much indebted for great personal courtesy during a recent visit to La Salpêtrière, is the author of an excellent article on Aphasia in "*Le Nouveau Dictionnaire de Médecine et de Chirurgie Pratique*."

† "*Journal de Médecine Mentale*," 1865.

common enough; possibly they are, but their study is not the less interesting on that account; and here I would ask what was the ultimate cause of the symptoms observed in this patient? I have heard the term nervousness applied to such cases, but this word throws no light on their pathology. Nervousness, like hysteria, is a word frequently used as a cloak to our ignorance.

Is it not possible that the abnormal symptoms might be due to some form of uræmic poisoning? There were two circumstances rather favouring this view—viz., the partial retention of a fluid which had for years been periodically thrown off, and the frequent partial suppression of the urinary secretion. In reference to this latter hypothesis, it is true that the volumetric analysis of the urine (made at the time when the secretion was in its normal quantity) did not disclose a predominance of any particular ingredient; still, I cannot help thinking that in this and similar cases, where the symptoms are intermittent, they may be due to some element in the blood which has a deleterious effect upon the cerebral circulation.

It will be observed that there is no abolition of a faculty in such cases as the above, but simply an obstacle to the manifestation of such faculty. The faculty of language is present, but one of the processes is wanting by which it is brought into communication with the external world.

CASE VII.—LEFT HEMIPLEGIA WITH APHASIA; NO DISEASE OF FRONTAL CONVOLUTIONS; EXTENSIVE DISEASE OF RIGHT HEMISPHERE; VEGETATIONS ON AORTIC AND MITRAL VALVES; FIBRINOUS BLOCKS IN THE SPLEEN.

William Lemon, a gasfitter, aged 40, was admitted into the Norfolk and Norwich Hospital on January 4th, 1868, with the following history:—He had been ailing more or less since Midsummer, but had been able to continue his work till early in November. A fortnight later he was suddenly seized with left hemiplegia, and considerable embarrassment of speech, to such an extent that a stranger could not understand him at all. His power of speech gradually improved, and at the end of a fortnight he could speak nearly as well as usual.

Condition on admission.—There is complete motor paralysis of left leg and arm; anæsthesia only partial, if any. He has no pain or abnormal sensation in the head, the organs of special sense are unimpaired, and there now remains but very slight embarrassment in his speech. There is a well-marked double bruit heard nearly all over the anterior part of the chest, but at its maximum intensity at the apex, the diastolic murmur being the most marked. Pulse 84, quite steady and regular, but very hard, sharp, and almost dicrotic. Urine, sp. gr. 1023, freely acid, slightly albuminous, and loaded with lithates.

January 18th.—This patient continued much the same as on admission up to 6 p.m. yesterday, when the nurse, on taking him his tea, noticed he had lost the power of articulation, although he seemed to know all that was going on; a few minutes before the power of speech was lost he spoke a few words, implying that he saw imaginary beings around his bed. The power of articulation was never recovered, and he soon became comatose, and died early this morning.

Autopsy.—Heart: weight 19 oz.; right ventricle contained coloured and decolorised clots extending just beyond the pulmonary

valves ; right auriculo-ventricular orifice admitted four fingers and a thumb ; tricuspid valves healthy ; walls of left ventricle immensely hypertrophied ; dilatation of left auriculo-ventricular orifice ; the mitral and aortic valves were both covered with fibrinous vegetations, apparently recent ; there was commencing atheroma to the extent of an inch and three-quarters at the origin of the aorta.

The Lungs were healthy.

Liver : weight 4 lbs. 2 oz., healthy.

Spleen : very soft and friable, contained several fibrinous blocks which appeared as white elevated patches on the surface, and on section were seen to be of the size of large walnuts, of a yellowish-white appearance, and of a waxy consistence,

Kidneys : the right weighed 11½ oz., the left 8 oz., both in a state of intense congestion.

Brain : stripped of dura mater, it weighed 3 lbs. 3½ oz. ; there was no abnormal vascularity or other morbid appearance, either on its convex surface or at the base. There was a general flattening of the superior surface of the right hemisphere, which was somewhat less developed than the left, and its convolutions were shrunk. The brain was carefully sliced, and no abnormal appearance disclosed until opening the lateral ventricles, when a yellow stain was seen on the upper portion of the right corpus striatum ; on a level with this body, but behind, and external to it—at about the middle third of the hemisphere—was a softened portion of about the size and shape of a large walnut ; there was also slight softening of the thalamus at its posterior part. On cutting into the corpus striatum, it was seen that the posterior two-thirds had undergone the softening process, being of a yellowish hue, and of a waxy consistency. Antero-posterior slices were made in both anterior lobes, but no morbid change revealed ; the frontal convolutions were examined with great care, and the right and left convolutions compared, but they seemed perfectly healthy ; but as the softening of the right hemisphere approached so near the surface of the right side—certainly within half an inch of Broca's region—it is quite possible that some slight alteration of the posterior part of the frontal convolutions may have existed, not patent to our means of investigation. The vertebral and basilar arteries were healthy, as also the termination of the carotids. There was no obstruction of the middle cerebral arteries, but that on the right side, when traced along the

fissure of Sylvius, presented at the point of its first bifurcation a milky appearance, to the extent of about a quarter of an inch in length. The olivary bodies were specially examined, and were quite healthy, as were also the medulla oblongata, cerebellum, pons, and crura cerebri.

Microscopic Examination.—A separate examination was made of the corpus striatum, and also of the softened hemisphere. In the corpus striatum there was no proper brain structure; an absence of vessels and nerve fibres; an abundance of granular matter. In the porton taken from the hemisphere there was an absence of nerve fibres, and the vessels were coloured with fawnish pigment; there was an abundance of granular matter, with here and there a fat globule.

The above case is extremely interesting from several points of view. In the first place, I would observe that the cardiac disease was doubtless the primary cause of the softening of the cerebral tissue; and it is extremely probable that some vegetations, similar to those observed on the aortic and mitral valves, had become detached, and thus had been carried into one or more of the cerebral vessels, although no positive evidence of obstruction existed after death.

The condition of the spleen is confirmatory of this view, as the fibrinous blocks found in that organ undoubtedly betokened an obstruction to the splenic circulation similar to that which had probably produced the cerebral symptoms. It would seem that these fibrinous deposits in the spleen have been frequently observed in the autopsies of aphasic patients. In four of Dr. Wm. Ogle's cases, this condition of spleen was observed; and in each case, as in that of Lemon, there was also disease of the heart.

If the above observation is in direct antagonism to M. Dax's theory of the localisation of speech in the left

hemisphere, it is *à fortiori* opposed to that of Professor Broca; for although the softening was suspiciously near the third frontal convolution of the *right* side, the *left* frontal convolutions, as indeed the entire left hemisphere, presented no trace of disease whatever.

It will be observed that the lesion of speech was associated with paralysis of the *left* side. This coincidence of aphasia with left hemiplegia is, I believe, much more common than is generally supposed; I have met with it several times in my own practice, and I have already, in the preceding pages, mentioned cases where this combination of symptoms was observed. Sir Crichton Browne has informed me that he has collected six cases of left hemiplegia with aphasia, which I trust he may be induced to place on record. With this accumulation of evidence, I am astounded to read in Huguenins' article in "Ziemssen's Cyclopedia," that "in general, no case of aphasia following injury or disease of the right side of the brain has come under our notice." The relation between right hemiplegia and aphasia, although a tolerably constant one, is by no means absolute.*

* Whilst this is passing through the press, my attention has been called to a case reported by Professor Michel Catsaras of Athens, the subject of which was a man who had several slight apoplectic seizures with left hemiplegia and aphasia, which in each instance soon passed off; the patient, however, ultimately had an attack of apoplexy of a more serious and definite type, and remained permanently hemiplegic on the left side. As this man was right-handed, it was suggested, by way of explanation, that in his case the anterior pyramids *may* not have decussated. "La France Médicale," 1884, No. 83.

CASE VIII.—LOSS OF SPEECH OF AN INTERMITTENT CHARACTER, PRECEDED BY NUMBNESS OF TONGUE; LINGUAL SPASM; FATAL TERMINATION, WITH SYMPTOMS OF BULBAR PARALYSIS.

Walter Hare, an artisan, aged 28, came under my observation as an out-patient of the Norfolk and Norwich Hospital, on October 12th, 1872, with the following antecedent history. He had been married five years, and had three children; had never had syphilis, but was an inveterate smoker.

He had always enjoyed good health till about nine months before, when, whilst engaged in his ordinary employment, and without any apparent cause, he was seized with giddiness, the room seemed to him to be working round with him; he was obliged to discontinue his work and walked home with difficulty, reeling from one side of the pavement to the other, in such a manner as to lead the bystanders to think he was drunk.

The feeling of giddiness, which was at this time the only symptom, lasted for about a month, when he was able to resume his work, and he remained quite well for about half a year, when, whilst at work, he was seized with numbness in the tongue, and this sensation occurred several times daily, lasting for about half an hour.

This peculiar affection of the tongue continued as the only morbid symptom till about a month before he came to the hospital, when, whilst taking a meal, the habitual numbness came on, and when it had lasted two or three minutes, his speech quite left him, and, to use his own expression, *he was like a dumb man*. He had just before informed his wife that the numbness had commenced, and in answer to her inquiry whether he was getting better, he shook his head, and was unable to say "no;" in fact, he could not utter a single word, and was absolutely speechless. This inability to speak, together with the numbness, lasted three-quarters of an hour, when they both left him at the same time, and he could speak as well as ever.

The above combination of symptoms recurred at intervals, and

he was in such a constant state of uncertainty as to whether his speech would leave him or not, that when sent by his master on an errand to a shop, he was in the habit of writing down what he wanted to purchase, for fear that the aphasia might come on, and that he should not be able to say what he wanted.

Whilst conversing with me, he said that the numbness in the tongue had just come on, but, as yet, he was able to speak. I asked him to protrude the tongue, which he was able to do straightly and completely. I pricked the tongue with a pin, and he said he did not feel it. In a few minutes the numbness left him, and he said it was passing down his right side—that he felt a numbness in the right arm, right side of the body, and right leg. This perverted sensation lasted about two minutes, the arm recovering first, then the side, and lastly the leg.

In answer to my inquiry, he told me that when the fits of “dumbness” come on, “his tongue is not set fast,” he can move it in his mouth in all directions, but the protruding power is interfered with, as he can only protrude it half its usual length.

November 16th.—No particular change occurred in this man's condition until to-day, when the habitual numbness in the tongue began, his speech became very indistinct, he became dizzy, and fell down insensible, remaining unconscious for half an hour.

January 1st, 1873.—For several days past he has had frontal headache, and noises in the ears.

February 5th.—The patient has an anxious expression, and the face is a little swollen; he seems somewhat stupid in his manner, and is a little deaf; at all events, he does not catch what is said as readily as formerly. He now expresses himself with some difficulty, and says that since his fall in November the power of speech has been permanently affected, whereas before this accident, when the aphasia was not present, his speech was as fluent and easy as possible. The tongue is protruded without difficulty, but decidedly to the left side. He has less power in the right leg, in which there is decidedly less sensation, and his gait is somewhat affected.

April 2nd.—Has now constant pains in the left temple, his cheeks are very much swollen from flaccidity of the muscles, has difficulty in swallowing fluids, which he says he “cannot get rid of.”

I will not enter into details about the further progress of this case; he soon discontinued his attendance at the hospital, and I lost sight of him, but I have reason to believe that he ultimately died with all the symptoms of Bulbar Paralysis.

In commenting upon the peculiarities of this case, I would call attention to the complete absence, at all events in the first instance, of any symptom pointing to hemispheric disease. It is true that eventually there was slight impairment both of motion and of sensation in the right leg, but this only occurred as a late symptom.

As far as the function of speech was concerned, it seems to have been a mere affection of the articulation—what Kussmaul calls *anarthria*—the result of paralysis and atrophy of the muscles necessary for articulate speech, probably dependent upon lesion of the centres or nuclei of the hypoglossal, facial, spinal accessory, and glosso-pharyngeal nerves, which have undergone the degenerative process.

In the peculiar disorder lately described as Thomsen's disease, which is characterised by spasmodic rigidity of certain voluntary muscles, the tongue is said to be usually involved, and the peculiarity of the spasm is its transitory and initial character, occurring at the very moment of executing a movement, or rather during the execution of a movement; the muscular spasm also is devoid of that painful character which appertains usually to cramps in healthy individuals. It will be observed that the early symptoms in Hare's case resembled in some respects those observed in Thomsen's disease.*

* In the "Archives de Neurologie" for January, 1883, is an essay by Ballet and Marie, entitled "Spasme Musculaire au début des Mouvements Volontaires," which the authors characterise as a functional trouble not

CASE IX.—LOSS OF SPEECH OCCURRING AS A
PUERPERAL SYMPTOM; LACTEAL DERANGEMENT;
RIGHT HEMIPLEGIA; FATAL TERMINATION.

On September 7th, 1886, I was requested to see, in consultation with Dr. Watson, of Norwich, Mrs. S., aged 23, who had given birth to her second child eight days previous to my visit.

Upon inquiry, I ascertained that she had never been the subject of any cardiac or rheumatic affection, that she had never suffered from any nervous disorder, and, in fact, that she had always enjoyed good health during her single life, with the exception of a disposition to occasional headaches. Her mother was insane and died in the Norwich City Asylum, but beyond this fact there was no neurotic tendency in the family.

She was delivered of her first child in July, 1885, and at the seventh month of this her first pregnancy, she had some obscure mental symptoms with some embarrassment of speech, which lasted about a month. Her first confinement passed off quite naturally, and she nursed her child for nine months, at first with both breasts, but in one breast (it is believed to have been the left) there was galactorrhœa for some weeks, and then the supply ceased entirely in this mamma.

hitherto described in France. The chain of symptoms enumerated are those of Thomsen's disease, and a case is cited in some respects similar to Hare's, in which the authors say there was "*une gêne assez prononcée des mouvements de la langue, semblant siéger surtout vers la racine de celle-ci, gêne toute passagère d'ailleurs, et ne survenant que de temps en temps.*" In this most interesting and highly original essay, the authors object to the term "*pseudo-hypertrophic paralysis*" which has been applied by some German writers to this type of disease, as they say that its hypertrophic element is doubtful. In the same journal for November, 1884, Dr. Romain Vigouroux publishes a case in which the symptoms of Thomsen's disease co-existed with those of pseudo-hypertrophic paralysis. I recommend the perusal of both these valuable articles to all those who are interested in obscure points of nervous pathology.

Mrs. S. continued quite well till three months before her second confinement, when a gradual loss of power occurred in the right arm and leg, but principally in the arm; a month before her confinement, embarrassment of speech was noticed, which culminated in complete aphasia six days after delivery, which was quite natural, and unattended by any straining or unusual effort; there was no hæmorrhage, and the lochia were quite natural. The total loss of speech was sudden, for on the evening of the fifth day, although her speech was embarrassed, she could converse and make herself understood, but on the morning of the sixth day it was observed that she was completely aphasic; there was no loss of consciousness, and her general appearance was as usual, the only difference being the total suspension of the power of articulate language. This sudden exasperation of her symptoms could be attributed to no apparent cause; she had not been exposed to any mental shock or disturbance of any kind, but a thunder storm of very unusual severity occurred the evening before.

On the second day after delivery, there was a sudden turgescence of the breasts with an unusual quantity of milk, the lacteal secretion being so abundant that, although the child sucked vigorously, the milk had to be removed artificially; the supply was equal on both sides. This lacteal overflow was but of short duration, for the next day the quantity diminished perceptibly, and on the fifth day the child had to be weaned because the supply was gone.

At my visit on the eighth day after parturition, I found her with right hemiplegia and aphasia, and I observed that she was unable to protrude the tongue. There was no pyrexia, the temperature was normal; the pulse was 74, and there was no cardiac trouble of any kind; there was no pain or swelling of the body, and no abdominal or pelvic complication whatever; there was, however, retention of urine, but nothing abnormal in the secretion itself.

Although unable to speak, she evidently understood all that was said, and seemed annoyed and became angry when too many questions were put to her; and to every question, whatever it might be, she invariably said "The other day." I asked her how many children she had; she replied, "The other day." I then asked her

what she had for her breakfast ; she replied "The other day." She could say nothing else, and this recurring utterance, whether appropriate or not, she repeated on all occasions ; it was a stock phrase with her, and of course had no intellectual value.

Without developing any fresh symptom, Mrs. S. gradually became weaker, and sank from exhaustion six weeks after her confinement ; and within an hour of her death, in answer to an inquiry as to how she felt, she replied, "The other day," which was the only phrase she had uttered since the commencement of her attack.

The above case is interesting from the association of aphasia with the puerperal condition. Hemiplegia is not an uncommon symptom connected with pregnancy and childbirth. Churchill has recorded 22 cases of paralysis during pregnancy collected by him from various sources, but although difficulty of articulation may have been noticed in some of these cases, it was probably simply due to paralysis of the tongue and the muscles which are concerned in the articulation of words, without any real disturbance of the faculty of language.

One of the leading obstetricians of London, to whom I communicated the details of the above clinical history, informs me that he has never met with a similar case ; and amongst 8,000 cases of midwifery recorded by a French authority, M. Sireday, not a single instance of the coincidence of aphasia with the puerperal condition is mentioned ; in fact, this combination does not find a place in our classical treatises of midwifery, and the only case that I have met with in my reading is one recorded by Dr. Leith Napier, the subject of it being a lady, who, seventeen days after her confinement, on being subjected to considerable vexation, suddenly became speechless ; this was followed in three days by partial paralysis,

which culminated in complete hemiplegia two days later. Dr. Napier attributed the above symptoms to occlusion of the left middle cerebral artery from embolism. The patient slowly improved, and eventually recovered.*

It is only quite recently that prominent attention has been called to the association of aphasia with the puerperal condition, by a most interesting and exhaustive article by M. Poupon in "*L'Encéphale*" for July, 1885. This important communication is based upon a case observed by the author at La Charité, in the ward of Professor Laboulbène. The subject of it was a woman, aged 24, Julie M., who on the second day after a perfectly natural delivery, was seized with right hemiplegia and aphasia, her vocabulary (as in my own case) being limited to three or four words in answer to all questions, the expressions used being, "eh bien," "oui, oui," "mais j'ai mais." This patient is described as having had an attack of articular rheumatism some years before, and as there was hypertrophy of the heart with mitral disease, the author makes the diagnosis of embolism of the left middle cerebral artery, due to a mitral constriction, upon which was superadded an endocarditis, caused by her puerperal condition; he explains the fact of the sudden occurrence of the symptoms of embolism on the third day, by the hypothesis that the embolus might have been nearly detached during the labour, but that a fresh effort was necessary to complete its separation; and as she was suddenly taken speechless whilst at a meal, he thinks the change from the recumbent to the

* Puerperal Embolism—Aphasia—Hemiplegia—Recovery. By A. D. Leith Napier, M.B., "*Edinburgh Medical Journal*," Sept., 1877, p. 222.

sitting posture may have been sufficient to complete the detachment of the embolus.

M. Poupon enters at considerable length into the pathology of the above case, and also gives a short analysis of others that have fallen under his notice, in two of which he says there was an evident relation between the lacteal secretion and the appearance of the aphasia ; in one instance, however, the lacteal disturbance preceded the cerebral accidents, and in the other it followed them ; in the latter case (which was one of exceptional interest from the fact of the subject being *left-handed*, and the paralysis being on the left side) it is stated that from the moment the left hemiplegia and aphasia were observed, the lacteal secretion ceased in the right breast, whilst in the left (the paralysed side) it appeared to increase, and was much more abundant than usual. According to the statement of the patient, the temperature of the left or paralysed side as well as that of the corresponding breast, was higher than on the right side ; the perspiration was also much more copious on the left than on the right side.

In commenting upon this last observation, M. Poupon calls attention to the increase of the lacteal secretion under the influence of the paralysis, and he considers the pathological condition was probably vaso-motor paralysis of the breast, resulting in a dilatation of the vessels and a more abundant secretion of milk.*

On reviewing the symptoms manifested by the patient whose clinical history I have described, it will be noted that Mrs. S. never had any rheumatic affection or

* "Des Aphasies Puerpérales," par H. Poupon. "L'Encéphale," No. 4, 1885, p. 393. I shall have occasion again to refer to this original communication in a subsequent chapter.

cardiac complication of any kind; the labour was quite natural, and there was no feature in her condition to suggest the idea of septicæmia or of blood dyscrasia.

The only unusual symptom was anomalous lactation, for it will be remembered there was great turgescence of the mammæ, and an excessive flow of milk—quite a galactorrhœa for 24 hours—and then a somewhat sudden disappearance of the secretion.

From the comparative rarity of the association of loss of speech with the puerperal state, I hesitate to venture upon any decided opinion as to the pathology of the above case. The symptoms could scarcely be due to any merely transient cause, for they had existed in a modified form for three months before parturition, and became intensified a few days after labour; the absence of any cardiac lesion, and the gradual development of the nervous symptoms would rather point to cerebral thrombosis than to embolism.

CASE X.—INTERMITTENT APHASIA; EPILEPTIC LOGONEUROSIS; PECULIAR FORM OF AURA; GOOD EFFECTS OF ELECTRICITY; RECOVERY.

R. Dalliston, a miller's servant, aged 27, a total abstainer, was admitted under my care into the Norfolk and Norwich Hospital on May 3rd, 1884, with the following antecedent history.

There was no hereditary tendency to neurotic disease; a sister had been the subject of hysteria, but beyond this circumstance his family history was quite of a negative character. He was better educated than most men of his class, and was very fond of reading; he had always been extremely temperate in his habits, and for some years past had been a total abstainer; he had never contracted syphilis, and had always enjoyed the most robust

health till December, 1879, (20 months after marriage,) when he was suddenly seized with pain at the back of the head and down the nape of the neck; the pain was so severe that he rushed out of his house, and ran about in such an excited manner and was so violent as to lead the bystanders to think he was mad.

When shortly afterwards he was seen by his medical attendant, Mr. Long, of Wells, he was more composed, and intimated by signs that he had pain in the head, but it was observed that he was *absolutely speechless*. As there was no paralysis of any kind, Mr. Long was puzzled at his symptoms, and told me that if the subject of them had been a female, he should have considered her as under the influence of violent hysteria; Mr. Long added that there was "a sort of unreality about the patient." He was treated by bromide of potassium, which seems to have relieved him, but the loss of speech lasted four days, when it suddenly returned, and he was able to resume his usual employment.

Four years now elapsed, during which time he continued in perfect health, and evincing no psychical anomaly of any kind, when about five weeks before his admission to the hospital, on leaving the mill one evening, he complained of a feeling "as if a fit were coming on;" he was then seized with pain at the back of the head, and became so outrageous that it required two strong men to conduct him home, as he struggled so violently. On reaching his house he seemed beside himself, and even threatened his children, who had to be put out of the way. On the arrival of Mr. Long, he had become quiet, but was totally speechless; he pointed to his head, and was quite rational. As at the end of five weeks there was no return of the power of speech, he was removed to the hospital.

Condition on admission.—The patient has the appearance of robust health, seems very intelligent, and presents no other abnormal appearance whatever but complete loss of the power of articulate language, the inability to speak having this time lasted five weeks, with the exception of an interval of two hours, eight days ago.

Although there is complete suspension of the faculty of *articulate* language, the *general* faculty of language is unimpaired, as he is able to describe all his symptoms in writing and also by dactylogy, as

it so happens that both he and the house surgeon's assistant understand the deaf and dumb alphabet, and thus hold conversation with each other.

He can phonate, and there is no paralysis of the lips, facial muscles, palate, or tongue; these organs for all purposes but speech, are completely under control. His intellect is clear, the idea is present, the words are not wanting, but articulation is not at the service of the words. That he is clearly in possession of the acoustic word-signs is evident from the fact that he can translate the same into writing. He was ordered bromide of sodium, gr. xv., three times a day.

May 12th. At my visit this morning, nine days after his admission, I find he can converse freely, the power of speech having returned at 7.40 a.m., after an absence of six weeks and two days.

He gives the following very curious account of the advent and the departure of the aphasia, both of which are heralded by what he calls "fits," distinguishing them by the respective names of "*silent fits*" and "*talking fits*." On being asked to describe these attacks, he says that the silent fit is preceded by intense heat at the nucha, then follows agonising pain at the same spot, he feels "as if several balls ran from his loins to his neck," causing a feeling as if something had exploded, and then his speech leaves him; the loss of speech is preceded by convulsive twitchings of the muscles at the back of the neck, apparently of an epileptoid character, and accompanied by much pain.

13th. The power of speech recovered yesterday lasted only fourteen hours, for early this morning the pain in the neck, peculiar to what he calls his *silent fit*, came on, and he became speechless. The interrupted current was applied to the nape of the neck and to the tongue, with the hope of restoring speech, but with no beneficial result.

14th. Speech still absent, the power of phonation is also nearly entirely abolished to-day; he is unable to make a noise in his throat by singing or otherwise, and can produce nothing beyond a feeble and nearly inaudible grunt.

His muscular strength as tested by the dynamometer disclosed a marked difference on the two sides, the grasp of the right hand showing a pressure of fifteen kilogrammes as against thirty-three kilogrammes in the left.

16th. At my visit to-day, I find he can talk freely, the aphasia having lasted this time three days. He informs me that at 3.45 a.m. pains in the back began (talking fit), which increased in intensity till 5.30, when he began to talk, indistinctly at first, but at 7 o'clock could talk plainly. His voice to-day is more husky than after the last recovery of speech; he says that he has noticed that each time speech returns, the voice gets hoarser in tone.

22nd. Speech lost suddenly to-day, having been preceded by pain at the nucha of half-an-hour's duration.

26th. Faradic current applied at 9.30 p.m., in consequence of the recurrence of the pain at the nucha; the electricity relieved the pain, which entirely subsided at 11 p.m.

28th. Pain in the back (talking fit) commenced at 5.30 a.m., resulting at 6.30 in the recovery of speech, which he had lost for six days.

30th. Pain at nucha (silent fit), followed by loss of speech; was faradised at once.

31st. Speech returned to-day at 2 p.m., having been preceded by pain in the back (talking fit).

June 3rd. Pain in the neck (silent fit) set in at 9 a.m.; faradisation was applied immediately; the pain subsided in an hour and a half, without loss of speech. Mr. Kempster, the house surgeon's assistant, says he has remarked that if the battery is applied before the aphasia occurs, the power of speech is retained.

The patient himself has the greatest confidence in the battery, and says "it eases my pain, and retains my speech."

4th. The urine on examination being found loaded with oxalates, a mixture containing Nitro-Hydrochloric acid and infusion of gentian was prescribed.

At 4.30 p.m., whilst in the chapel, he was seized with pain at the nucha, followed by loss of speech.

8th. Speech returned, its restoration being preceded by the usual pains in the back. A shower-bath was ordered to be given daily.

11th. Pain in the neck at 7.45 p.m.; loss of speech at 8.30.

16th. After the shower-bath at 7.20 p.m., the pain in the back set in, followed by the recovery of speech at 8.30, after an absence of five days.

19th. Pain in the neck at 4 a.m., followed by loss of speech.

21st. Speech restored at 10.30 p.m., having been preceded by the usual pain in the back.

On asking the patient to explain his own views as to what takes away his speech, he replied that he presumed it was the pain in the neck; he also added that he never had the pain in the back without speech being restored. He said the pains of both kinds were diminishing very much in severity.

28th. Speech left him at 4.40 a.m., preceded by neck pain; restoration of speech at 3.30 p.m., after a slight pain in the back.

July 3rd. Speech continues all right; he has not passed water for 45½ hours. He says that there has been a difficulty in micturition for several months, and occasionally a retention of urine of 24 hours. He says when the speech is gone, he has less trouble with his water!

8th. I happened to be in the ward to-day at the beginning of a so-called "silent fit" with the characteristic pain at the nucha; I had therefore the opportunity of noting its peculiarities. It is clearly of an epileptic character. I observed marked rigid contraction of the muscles at the back of the neck—in fact, clonic twichings, leaving after each convulsion a kind of tonic contraction. He appeared to be in very great pain, and put his left hand to the nucha, as if it gave him relief. The fit lasted rather less than an hour, and then he said he only felt weak, especially on the right side.

From this period he continued rapidly to improve, and was, in a marked manner, benefited by faradisation; he was discharged cured after eleven weeks residence in the hospital.

The above case is one of exceptional interest, whether regard be had to the unusual combination of symptoms which it presents, or to the questions of diagnosis, pathology, and treatment.

On analysing its clinical history, it will be seen that the salient features were total loss of speech of an intermittent character, lasting from a few hours to six weeks; the suspension of the faculty of articulate language

always coinciding with pain at the nape of the neck, and its restoration being as invariably accompanied by pain in the lumbar spine. The coincidence of pain in the above localities with the abolition and the restoration of speech respectively was so constant, that he described the speech phenomena as the "silent fit" and the "talking fit."

Before entering into the inquiry as to what was the matter with this patient, or what was the cause of his intermittent attacks of aphasia, I must for a moment glance at the latest contributions to this branch of neurology.

Not only have neuropathologists located speech in a certain definite portion of the brain, but they have of late endeavoured to localise the various psychical elements which enter into the complicated machinery of speech, maintaining that there is a certain functional independence between the different territories of the cerebral cortex.

In a former chapter I described Professor Charcot's schematic diagram of the centres and tracks of articulate language; Kussmaul of Strassburg,* Wernicke of Breslau,† and Baginsky of Nordhausen‡ have also framed diagrams of a similar character; but as I prefer that of M. Charcot, I will refer the reader to the detailed description I have given of it at page 38, and assuming for the moment that it contains, at least, the germ of scientific truth, I will inquire what portion of the supposed speech-track was affected in the case I am now considering.

* "Die Störungen der Sprache." S. 182.

† "Der aphasische Symptomencomplex, eine psychologische Studie auf anatomischer Basis." S. 34.

‡ "Berliner klinische Wochenschrift," No. 37, 1871. S. 441.

In order to gauge Dalliston's psychical condition by M. Charcot's schema, I must first glance at the elements that enter into the constitution of language, which are as follows:—

There must be sounds or signs suggesting an idea, and they must be transmitted to the sensorium by means of the ear or of the eye.

The formation of an idea, probably in the grey cortical substance of the brain.

There must be the memory of words or of signs necessary to express this new-born idea.

There must be the power of co-ordinating the movements necessary for the external manifestation of language.

Bearing in mind the above conditions, in what part of the speech-track did the impediment exist?

1st. The ideational centre (I C) was evidently unimpaired, as he retained all his intelligence, and it is clear that ideas were produced as the result of impressions made on the senses, ostensibly in the cellular net-work of that portion of the cerebral cortex set apart for that purpose.

2nd. The common auditive centre (C A C) was also unimpaired, as his acoustic nerve transmitted outward sounds to it.

3rd. The auditive centre for words (A C W) was intact, as he had not only an intelligent perception of what was said to him, but the "word-symbols" were at hand, as shown by his ability to translate the same into writing. He retained words in his memory as acoustic signs, but was incapable of uttering them, although his intellect was clear, and the movements of the organs of articulation were free.

4th. The part that was out of gear was the centre of articulate language (C A L), for although his intellect was clear, and he retained words in his memory as sensory images and as symbols of thought, he was incapable of uttering them, and they could no longer be enunciated as a motor combination of articulate sounds ; he could phonate, the movements of the tongue were free, and there was no paralysis of the lips, mouth, or palate, which for all purposes except speech, were completely under control ; his organs of articulation were free to move, but did not respond to his mental impulses to speak. The idea was present, the words were not wanting, but articulation was not at the service of the words, and he was totally unable to accomplish the physico-psychical act of the expression of thought, by which the latter is converted into articulate language.

Pathology. Was there or was there not any persistent change in this patient's nervous centre ? The symptomatology of the case could be accurately studied, but it was not easy pathogenetically to refer the symptoms to changes in the organic mechanism.

A superficial observer would at once say, "Oh ! it was simply an exaggerated form of hysteria." Now, in the first place, genuine hysteria is uncommon in men. Of 332 cases tabulated by Hammond, only three were males ; moreover, Dalliston presented quite the reverse of the hysterical diathesis ; there was no emotional disturbance, no indisposition to exert the will, no hallucinations or delusions ; his inability to speak did not depend on want of perception or of intelligence, but on want of the power to set in motion the complicated instrumentalities necessary for articulate language.

On analysing carefully all Dalliston's symptoms, I am inclined to class his case amongst the numerous shades of epileptiform attacks. It is true that some of the symptoms of true epilepsy were wanting; the convulsions were not those which characterise *epilepsia gravior*, nor was there the loss of consciousness observed in that type of the malady.

It will be observed that he had a distinct aura, characterised by abnormal sensations in the cervical spine. Gowers, in his admirable monograph, says that all his cases with a spinal aura were epileptic.*

It may be said that the uncontrollable acts of violence and strange behaviour at the onset of the disease some years ago, were those of automatism, and were hysteroid in character; but the same want of control is observed as a symptom of epileptic vertigo. Trousseau, in his admirable chapter on Apoplectiform Cerebral Congestion, mentions such cases which he considers as instances of irregular epileptic paroxysms, one of the most striking being that of a French judge, who was president of a

* "Epilepsy and other Chronic Convulsive Diseases," p. 55. In the same chapter, this accurate clinical observer, in describing the modes of onset in epilepsy, writes as follows:—"Inability to speak often accompanies a fit which commences in, or early involves, the right side of the face. For instance, a girl had minor seizures, which consisted in a sensation of tingling in the right arm, which passed up to the angle of the mouth, and then she became unable to speak for about five minutes. In left-handed persons, the speech-centre is usually on the right side, and not on the left side of the brain; and the association just mentioned was well exemplified by a left-handed man, who, at the age of thirty-one, became liable to fits, which commenced by spasms in the left side of the face, spreading thence to the left arm, with loss of consciousness. Inability to speak preceded each attack for ten minutes, and persisted afterwards for the same time. Some of these cases are accompanied by a simultaneous sensation in the tongue."

court of justice, and who was subject to fits of epileptic vertigo. On one occasion, whilst presiding in court, he got up all on a sudden, and went into the ante-room. The usher of the court followed him, and saw him make water in a corner of the room ; a few minutes afterwards he returned to his seat, and listened with intelligence to the pleadings of the advocate, which had been momentarily interrupted. He evidently had no recollection of the incredibly incongruous act he had just committed.*

Kussmaul speaks of cases somewhat similar to Dalliston's, under the head of Aphthongia, or reflex aphasia, a term used to designate cramps in the territory of distribution of the hypoglossi, which set in whenever an attempt to speak is made, and which render articulate expression impossible. He says they bear resemblance to writer's cramp.

In one case, a child who was suffering from chronic inflammation of the neck, was suddenly frightened, and was afterwards seized, whenever it attempted to speak, with a spasm of the lingual muscles, which rendered it speechless.

In another case, the subject was a man in whom an operation for the removal of the tonsils was followed by marked disturbances of sensation, loss of taste, aphonia, cerebral congestion, and epileptiform attacks. On every attempt to speak, the tongue became immovably fixed to the hard palate. The intelligence was unimpaired, and the patient was able to write and to calculate.†

Professor Ball in a highly interesting article in "L'En-céphale," for March, 1881, relates the clinical history of a

* Clinique Médicale, tom. ii., p. 23.

† "Störungen der Sprache," s. 239.

man, aged 45, who, in a fit of passion, was suddenly struck dumb. Although speechless, he experienced no difficulty in expressing his thoughts in writing. There was no paralysis of motion or of sensibility, the tongue was easily protruded and moved without difficulty from one side to the other, but when the patient attempted to speak, there was a spasmodic contraction of the muscles of the tongue, causing that organ to assume the form of a convex dome, and to be closely applied to the roof of the palate. When he thus made useless attempts to speak, the tongue became hard and stiff, but when at rest it was as soft and flexible as in the normal state. At the end of a few days, and without treatment of any kind, speech was restored as quickly as it was suppressed.

M. Ball, whilst refusing to admit the existence of any permanent organic lesion, suggests the hypothesis of a spasmodic ischæmia, limited to an extremely circumscribed vascular territory, which produces functional disturbance, which disappears with the return of the circulation. He compares the above condition to the temporary loss of visual power described by oculists as "scintillant scotoma," where ophthalmoscopic examination has sometimes demonstrated the existence of anæmia of the retina, evidently of a spasmodic character; for, although there is sudden and complete blindness, after a few hours' rest, it vanishes as unexpectedly as it arose.*

* Previous to the publication of his essay in *L'Encéphale*, Professor Ball, at the annual meeting of the British Medical Association at Cambridge in August, 1880, read a paper on functional ischæmia of the brain. In this communication, after citing the clinical history of various cases that had fallen under his own observation, M. Ball maintained that all the symptoms of organic injury of the brain may be caused by functional ischæmia; also that spasmodic contraction of the brain-vessels, when once

It will be seen that Dalliston's symptoms differed in many points from those described above. It seemed almost a case *sui generis*, and on reviewing all the features of it, I am inclined to regard them as due to vaso-motor disturbance—to disorder of the sympathetic system.

It will be observed that there was invariably an initial aura epileptica, the epileptogenous zone always being in the neighbourhood of the cervical sympathetic.

The best authority that I am acquainted with on this subject, Professor Eulenberg, adopting Du Bois-Reymond's language, speaks of a *hemicrania sympathetico-tonica*, which is a disorder of the vaso-motor system, consisting of a tonic spasm of the arteries of the head, caused by tetanus of the cervical region of the sympathetic.

The transitory and fitful character of the symptoms; the invariable presence of the epileptic aura; the epileptogenous zone being always in the neighbourhood of the cervical sympathetic; the beneficial result of electricity to this part, all point to the sympathetic system as the seat of the disorder in this exceptionally strange case.

Whatever may have been the precise pathological condition that gave rise to the anomalous symptoms observed, I cannot think there can have been any persistent change in the organism; the progress of the case, and the patient's complete recovery would clearly not bear out the hypothesis of any structural injury to the brain.

induced, may persist for a considerable length of time without producing structural changes in the nervous centres.

In the discussion which ensued, the president, Sir Crichton Browne, without absolutely dissenting from M. Ball's theory of cerebral ischaemia, said that the symptoms admitted of other explanations, such as small extravasations, embola or patches of neuritis.

I can imagine that some objection may be made to the employment of the word Logoneurosis. I freely admit the desirability of adopting a nomenclature, which, on the face of it, conveys correct notions of the morbid condition existing, and I am most unwilling to adopt any term which does not imply the anatomico-pathological state of the patient; but where the pathogenesis is doubtful, it is unwise to employ a term implying accuracy of diagnosis.

Having for many years kept a record of cases tending to illustrate the pathology of aphasia, that have fallen under my own immediate observation, I could have considerably enlarged the above account of my own clinical experience, but as I have already exceeded the limits assigned to this section of my work, I prefer reserving the numerous other cases that have come under my notice for brief allusion in subsequent chapters, where they will serve for illustrating my remarks upon the cause, diagnosis, and treatment of Aphasia.

CHAPTER V.

Synonyms. Definition of Aphasia. What is Speech? Analysis of the faculty of Language—Max Muller; Kussmaul; Whitney; Ross; Cerise; Parchappe. Articulate Language is a Universal attribute of Man—testimony of Dr. Moffatt, Sir Bartle Frere, and Sir Samuel Baker. The organs of Voice, and the mechanism of articulation. Articulate language must not be confounded with the General faculty of language. On the language of Nature in contradistinction to acquired or artificial language or Speech—the Natural language of the Voice, of the Physiognomy, and of Gesture.

IN the preceding pages I have endeavoured to review what is at present known of the clinical history of aphasia; having first ventured critically to analyse a certain number of cases recorded by independent observers in various parts of the world, I have then minutely detailed several cases which I have myself had the opportunity of personally watching.

It will be observed that the observations which I have recorded in illustration of my subject have been of the most varied character—from the typical case where the loss of speech was complete, to that where the loquular defect was only a slight or even an occasional symptom, believing that it is only by the careful study of cases illustrative of the various forms and degrees in which derangement of the faculty of speech is observed, that we can hope to throw any light upon this much disputed question—the localisation of the Faculty of Speech.

I shall now proceed to dwell upon certain abstract points suggested by the consideration of the numerous cases to which I have referred in the former parts of this essay.

In the first place, it may be said that it is unwise to study aphasia as if it were a malady *per se*; it is clearly only a symptom, and one common to several morbid conditions, and not a pathological entity having a proper place in any nosological classification. Whilst fully admitting this, however, I maintain that, for the purposes of scientific inquiry, it is convenient at present to study loss of speech—as many other investigators are doing—as if it were really a morbid entity; for in many of the cases I have reported it was the sole abnormal symptom present. Besides, the faculty of articulate language is the great distinction which the Creator has made between man and the lower animals; it is one of the highest of human attributes, and there is no subject more worthy of the attention of the philosophical physician than the investigation into the causes which interfere with the proper use of this faculty. I shall, therefore—as it were under protest, and as a matter of convenience—consider aphasia under the various heads of Causes, Varieties, Treatment, &c.

Synonyms.—Few subjects in medical philology have given rise to so much discussion as the name by which loss of the faculty of articulate language should be scientifically designated, and in no branch of knowledge is it more necessary than in psychology, to define accurately the meaning of the various new terms which are being daily introduced into its nomenclature; a brief allusion, therefore, to the different names proposed cannot be omitted.

The term *Anaudia* was used by the Greek physicians for loss of speech, and the adjective *ἄναυδος* is employed by Æschylus.

“αἰθερία κόνις με πείθει φανεῖσ’,
ἄναυδος, σαφῆς, ἔτυμος ἄγγελος.”*

“Yon cloud of dust that choaks the air,
A true tho’ tongueless messenger.”

Alalia is used by Sauvages, Frank, and others, and Professor Lordat† in describing his own case employed the word “*Alalie*,” which latter term has also been adopted by M. Jaccoud. In 1861, M. Broca, when relating to the Anatomical Society of Paris his two remarkable cases, which have since excited so much interest throughout the scientific world, used the word “*Aphémie*” (α φημι); the Hellenists, however, protested, maintaining that it meant infamy, and not loss of speech. This last expression has latterly given way to *Aphasia*, a word adopted by M. Trousseau, who is supported in his preference for it by no less an authority than M. Littré; it is a very ancient term for mutism, and occurs twice in Homer; *Iliad* xvii., 695; and *Odyss.* iv., 704; the text being precisely the same in both instances—“*δὴν δέ μιν ἀμφασίη ἐπέων λάβε;*” here speechlessness from emotional causes is evidently implied.

Finkelnburg, objecting to the term *aphasia* as only applicable to phonetic symbols, suggests the word, *asym-bolia*, which would embrace all forms of disturbance in the formation and comprehension of symbols, and more accurately express the morbid derangement of function,

* Septem Contra Theb. V. 81.

† “Analyse de la Parole, pour servir à la théorie de divers cas d’*Alalie* et de *Paralalie*.” 1843.

in which the faculty of understanding and communicating ideas by acquired signs is either partially or wholly abolished.*

Kussmaul, who, in the work already quoted, treats not only of the disturbances of speech, but also of the symptomatic phenomena under which the execution or comprehension of any given signs by which it is sought to communicate conceptions is impaired, suggests the word *asemia*, as he considers the idea contained in "symbol" to be more restricted than that conveyed by the word "sign."

Other names, such as Aphrasia, Aphthongia, Aphthenxia, &c.,† have been suggested; indeed, so widespread has been the interest excited in the question of defects of language, that a host of philological suggestions have been made in reference to the generic term most appropriate for including all degrees of impairment of man's special prerogative, Speech.‡ Aphasia, doubtless from

* Viel einfacher und richtiger erscheint es, von einer "Störung der symbolischen Gehirnfunktion" zu reden oder den einheitlichen Ausdruck der "Asymbolie" zu wählen. "Asymbolie" wäre demnach diejenige krankhafte Funktionsstörung, bei welcher das Vermögen, sowohl Begriffe mittels erlernter Zeichen zu verstehen, wie auch Begriffe durch erlernte Zeichen kundzugeben, theilweise oder gänzlich aufgehoben ist. Es kann also auch ein Taubstummer, ja ein Thier, welchem jede Möglichkeit einer Wortbildung von jeher gefehlt, doch an Asymbolie erkranken. Berliner klinische Wochenschrift. 1870, S. 461.

† Dr. Popham, of Cork, considers that of all the words in the Greek language denoting modes of speech, the verb *φθέγγομαι* applies more than any of the others to the formation by the tongue of articulate sounds. The substantive *φθῆγξις* is used by Hippocrates, and the privative word *αφθῆγξις* would express an inability to enunciate syllables. He also thinks that the English word aphthenxia is as euphonious as many other derivations from the Greek.—*Dublin Quarterly Journal*, Nov., 1865.

‡ These philological contributions have not been restricted to medical

its simplicity and euphony, is now the favourite expression; it is the one I have selected, and in accordance with the neological phraseology of the day, I shall adopt the terms—Amnesic, Ataxic, and Epileptiform Aphasia, &c.

Definition.—The word aphasia has been used in a different sense by different authors; some, like Trousseau, Broca, Auguste Voisin, &c., limit its use to designate that condition in which the intelligence is unaffected, or at all events but slightly impaired; where thoughts are conceived by the patient, but he cannot express himself, either because he has lost the memory of the mechanical process necessary for the pronunciation of these words, or because the rupture of the means of communication between the grey matter of the brain and the organs whose co-operation is necessary to produce speech, does not allow the will to act upon them in a normal manner—the ideas are formed, but the means of communication with the external world does not exist. This definition would exclude all cases in which loss or lesion of speech was due to the alteration of the peripheral organs which co-operate for the production of sounds, as well as those in which the embarrassment of speech was attributable to a general lesion of the intelligence, such as idiotism,

writers. Mr. F. W. H. Myers, in an interesting and highly philosophical essay on “Automatic Writing,” criticises at considerable length the numerous terms recently introduced in the description of various disturbances of the faculty of speech. He says that a term is wanted which shall include all kinds of defect in the usage of signs—as in piano-playing, drawing, &c., faculties which may or may not be affected along with speech. As he considers “sign-troubles” would have an un-English sound, he suggests *asemia*, with the adjective *asemic*.—*Journal of the Society for Psychical Research*, May, 1885, p. 36.

cretinism, deaf-mutism and the different forms of mental alienation.

I prefer, however, using the word aphasia in its widest and broadest sense, and shall employ this term as a title for the whole group of disorders of speech,* thus embracing not only the loss, but all the various degrees of impairment of that faculty.

This interpretation of the word necessitates divisions and sub-divisions in which all shades and degrees of the affection may be included, and it has enabled me, in the preceding pages, not only to admit cases where the lesion of speech was decided and more or less permanent, but also those where it appeared only as an epiphenomenon, believing, as I have before stated, that such cases may be more useful than the typical cases which are so frequently put on record.

Before alluding to any subdivision of the subject, I would, just for one moment, ask what speech is?

Speech is a complex faculty dependent upon the integrity of several functions, by which man is enabled to give expression to his thoughts by sounds; it is, therefore, thought expressed phonetically. It is the expression of the thinking spirit in articulate sounds, resulting in the conveyance of ideas from mind to mind in logical method, and is the combination of the intellectual and the phonetic elements into one organic

* M. Jaccoud, in his lectures lately delivered at Lariboisière, has thus interpreted the word in its broadest sense; M. Charcot also defines the word as follows:—"The term aphasia, considered in its widest acceptation, comprises all the various, and sometimes subtle modifications evinced in its pathological condition, by the faculty which man possesses of expressing his thoughts by signs."

unity. By it, man is placed on the threshold between the worlds of matter and spirit ; by it, thought becomes materialised, and consequently rendered susceptible of making an impression on one of the senses, the channel for the sensory impressions of spoken words having its commencement in the peripheral expansion of the acoustic nerve, and that of written words in the retina. The mysterious connection between matter and mind as exemplified by the study of language is thus beautifully expressed by Max Muller: "There is, no doubt, in language a transition from the material to the spiritual: the raw material of language belongs to nature, but the form of language, that which really makes language, belongs to the spirit. With one foot language stands, no doubt, in the realm of nature, but with the other in the realm of the spirit ; and I may here express my conviction that the Science of Language will yet enable us to withstand the extreme theories of the evolutionists, and to draw a hard and fast line between spirit and matter, between man and the brute."*

This capacity to give outward expression to our inmost thoughts is one of the highest attributes of mankind, and is a typical sign of humanity ; without it we should be strangers to one another, condemned to know only ourselves ; incapable of combination for any useful purpose, and unable to intercommunicate our wants and desires ; in fact, we should, in a social sense, be but slightly raised above the level of the brute creation. By the possession of language, however, we are able to give to our intellectual conceptions a form which renders them capable of being perceived by the senses of our

* "Chips from a German Workshop," vol. iv., p. 234.

fellow men; and by a few articulate sounds, uttered almost with the rapidity of lightning, we are able to summon up a whole train of ideas in the mind of another, and language thus becomes thought outwardly expressed. "*La pensée est observable par la conscience et par les sens; par la conscience, c'est la parole intérieure ou le langage intérieur; par le sens, c'est le langage proprement dit.*"*

Kussmaul describes speech as the grammatical moulding of the material of thought, which has been perceived logically, and has been metaphysically elaborated.†

Whitney describes language as "the instrument of thought, the machinery by which the mind works; it is the spoken means whereby thought is communicated, and it is only that; words are not mental acts, they are combinations of sounds, effects produced upon the auditory nerve by atmospheric vibrations, which are brought about by physical agencies—agencies set in operation, it is true, by acts of volition, but whose products are no more mental than are pantomimic motions voluntarily made with the fingers. Language is not thought, nor is thought language, nor is there a mysterious and indissoluble connection between the two, as there is between soul and body, so that the one cannot exist without the other. There can hardly be a greater and more pernicious error, in linguistics or in metaphysics, than the doctrine that language and thought are identical. It is, unfortunately, an error often committed, both by linguists and metaphysicians."‡

"Language," says Ross, "is the instrument of the

* Proust, "*De l'Aphasie.*" Paris, 1872, p. 7.

† "*Die Störungen der Sprache,*" S. 29.

"*Language and the Study of Language,*" pp. 405, 410, 420.

social state, and in order that it may be a means of intercommunication between animals, it must possess to each a *subjective* and an *objective* value; or, in other words, it must fulfil an *impressive* and an *expressive* function.* As the outgoing or expressive function always results in a muscular action of some kind, it may be briefly named the *motor* function of language; and as the ingoing or impressive function presupposes the activity of the ear, eye, or one of the other senses, it may be named the *sensory* function of language. Analysis, therefore, leads us to recognise that speech consists of a motor and a sensory function, and that the former of these may be divided into an *emissive* and an *executive* department, and the latter into a *receptive* and an *apperceptive* department, with their corresponding nervous mechanisms." By the term receptive department, he indicates "the function of the peripheral sense

* He illustrates the above remarks by the signal cry of a rook, which, perched on a high tree, utters in quick succession, "Caw, caw, caw," and immediately the neighbouring community of rooks take to flight. The cry indicates that the rook which utters it is in a certain mental condition, but this indication would be of no value to the community unless a similar mental condition were excited in all the rooks that listened to the cry. In order that the active rook may be able to communicate his own emotion or thought to the other rooks, he must be possessed of outgoing or centrifugal mechanisms, by means of which he is able to give a certain signal; and in order that the signal may fulfil the function of a language, the passive rooks must be possessed of ingoing or centripetal mechanisms, by means of which they are able to appreciate the meaning of the signal, and each rook, in order to be an effective member of the community, must be possessed of both the outgoing and ingoing mechanisms, so that he may, as occasion requires, be able on the one hand to give warning of the approaching danger to the other rooks, and on the other hand to appreciate the meaning of the warning cry when hearing it from another rook.—"On Aphasia," by J. Ross, M.D., LL.D., p. 2.

organs with their centripetal conducting paths; by the term apperceptive department, he describes the function of the cortical sensory centres, and he understands the expression apperceptive faculty in the wide sense in which Kant employed the term apperception and its cognates.

At one of the meetings of the memorable discussion at the Academy of Medicine of Paris to which I have already alluded, one of the orators, M. Cerise, described language as a mould of the thought—*calque de la pensée*. Speech, says he, must be conceived before it is uttered, and in order that it may manifest itself externally, it must be transmitted to certain muscular organs—there must be a muscular act; thus speech may be considered as an annex of thought.*

During the same debate, another eminent psychologist, M. Parchappe, analysed at great length the various physiological conditions which are essential for the development of the faculty of language, asserting that the function of speech is accomplished by the manifestation of three distinct modes of physical force—development of intellectual force in the formation of an idea; of voluntary force in the determination of acts necessary to translate this idea into words; of motor force in the voluntary manifestations of the movements resulting in articulate voice. In short, the function of speech comprises three essential physical elements: Intelligence, Volition, and Movement.†

Speech, therefore, is a physico-psychical act by which ideas and conceptions are communicated to the outer

* "Gazette des Hôpitaux," June 15, 1865.

† "Gazette des Hôpitaux," May 11, 1865.

world, and by which the mind exercises its power, through the instrumentality of our corporeal organs. It consists of two distinct elements, one physical, somatic, and material—a movement; the other psychical, the interior speech—the *λόγος*; and we must take care not to confound this inward with the outward speech or articulation, which is only a form of expression dependent upon the integrity of several different functions, and which is liable to be deranged by a variety of diseases of the Nervous System.

I do not propose to discuss at any length the mechanical and acoustical principles of speech, or the complexity of the combined processes concerned in phonation; still, a few details upon this subject may not be out of place. Max Muller, writing on this subject, says that “although considerable progress has been made in the analysis of the human voice, the difficulties inherent in the subject have been increased rather than diminished by the profound and laborious researches carried on independently by physiologists, students of acoustics, and philologists. The human voice opens a field of observation in which three distinct sciences meet. The substance of speech or sound has to be analysed by the mathematician and experimental philosopher; the organ or instruments of speech have to be examined by the anatomist; and the history of speech, the actual varieties of sound which have become typified in language, fall to the province of the student of language.”*

It is necessary to bear in mind that vocal sounds and speech or articulate language are two things entirely different, and that the former may be produced in great

* “Lectures on the Science of Language,” 2nd series, p. 101.

perfection, where there is no capability for the latter. In nearly all air-breathing vertebrate animals there are arrangements for the production of sound or voice, in some parts of the respiratory apparatus. In many animals, the sound admits of being variously modified and altered during and after its production; and, in man, one such modification occurring in obedience to the dictates of the cerebrum, is speech.

Animals, especially those of the higher orders, are provided with a complex mechanism for the production and modification of sounds, and are endowed with an exquisitely organised acoustic apparatus for transmitting the impressions of sounds to the brain, but man alone possesses the faculty of grouping and systematically arranging the sounds produced, so as to form a language.

It has been asserted that Articulate Language is not an attribute universally appertaining to the human race, and that there are tribes of savages who have no speech at all. Books of travel abound with tales of wild men without the use of speech—men who whistle like birds and shriek like apes; and Lord Monboddo, in his “Origin and Progress of Language,” has a long chapter about the *homo tetrapus, mutus, hirsutus*, which according to him belongs to a barbarous nation that has not learned the use of speech.

I cannot dwell upon this point here, but would refer the reader to my treatise on “Darwinism tested by Language,”* where I have discussed the question of the universality of speech at great length, my views being supported by autograph letters to myself from some of the most eminent modern travellers—Dr. Moffatt, Sir Bartle Frere, and Sir Samuel Baker; the testimony of

* Rivingtons, London, 1877.

these distinguished observers militates entirely against the notion of the existence of a speechless tribe, and completely justifies my assertion that Articulate Language is a Universal Attribute of Man, and that the wildest savage that roams the woods in still undiscovered lands has a language, or the capacity for acquiring it.

Farrar in his chapter on Sound as the vehicle of Thought, says:—"Man possesses a capacity for the dynamic production of sound—as a mere animal being in the yet dark and unconscious slumber of infant life. The newborn infant enters the world with a cry, which is a mere natural sound, the expression of animal feeling, and is soon liable to various modifications for the purpose of expressing the different stirrings of life and sensations. These natural sounds are no more speech than the cries of animals are; no human intelligence is expressed by them; they are inarticulate and involuntary; they are mere modifications of the breath, and do not express the thinking spirit. Nevertheless they prove the possession of a high capacity, and this capacity is developed by man into significant speech, as the expression of his highest and innermost nature."*

"The modification of the voice," says Bishop, "depends on the development of the intellect, and accordingly the lower we descend in the scale of animal life, the less is the power of diversifying vocal sounds." Most of the mammalia are provided with a mechanism capable of producing an extensive range of sounds, but the intellect even of the highest quadrumana is not sufficiently developed to admit of their applying these sounds for

* "Language and Languages," by F. W. Farrar, D.D., F.R.S., pp. 70—71.

the purposes of articulate speech." In the various orders of the mammalia, the organs of voice present different grades of development and complexity of structure, producing in each case some peculiarity of *timbre* or quality of tone, by which we are enabled to distinguish them one from the other. Some species are mute, such as the giraffe, armadillo, and others, whilst some possess voices of greater or less intensity. The sounds produced by the organ of voice constitute the most important means of communication between man and his fellows; and the power of speech has, therefore, a primary influence on the development of his mental faculties.

It has been truly remarked by Sir Charles Bell, that for the articulation of a single word the co-operation of a great number of organs is required. For articulate utterance three factors are necessary: first—the emission of breath, due to the regulated action of the lungs, larynx,* and associated respiratory mechanism; second—the production either of musical notes or of a rustling sound, determined by the passage of the breath through the rima glottidis; a blast of air being thus driven by a more or less expiratory movement, throws into vibrations two elastic membranes—the *chordæ vocales*—which impart their vibrations to the column of air above them, and so give rise to the sound which we call voice, the strength

* The larynx, with its muscles and cartilages, is in reality a musical instrument of extraordinary perfection, and is generally considered to be a reed instrument, being more closely related to this than to any other variety of musical apparatus. Vocal sounds can be produced, even in the dead subject, by forcing a current of air through the larynx, although the epiglottis, the upper ligaments of the larynx or false vocal cords, and the upper part of the arytenoid cartilages be removed; provided the true vocal cords remain entire, with their points of attachment, and be kept tense and so approximated that the fissure of the glottis may be narrow.

of which depends partly on the degree to which the vocal cords can be made to vibrate; and the different notes which the same voice produces depend upon equivalent variations in the rate of vibration of these cords, which takes place according to the same laws as those of other elastic tongues, and the pitch of the notes is governed by the tension of these laminæ; third—the tones thus produced in the larynx undergo modification by other organs intervening between the glottis and the os externum—the hard and soft palate, uvula, tongue,* teeth, lips, and nostrils, and the result is the production of those articulate sounds which constitute language.†

Here I must remark that it is important not to confound the *faculty of articulate language* with the *general*

* The tongue, which is popularly credited with the power of speech, plays only a subordinate, though important part in this function, as shown by cases in which nearly the whole organ has been removed on account of disease, without seriously interfering with speech. A few years ago, Twisleton published a book, entitled, “The Tongue not essential to Speech,” in which he controverted the opinion of Cardinal Newman, that miracles were performed in the post-apostolic period, and that they happen even in the present day. One of the most notorious of these miracles was the recovery of speech by the so-called African Confessor, whose tongue was cut out at Tipasa, A.D. 484, by the order of the heretical vandal Huneric. Twisleton shows that it is not necessary to assume a miracle in order to account for the Confessor’s recovery of speech. He further adduces a number of well-authenticated facts from both ancient and modern times, which prove beyond the possibility of a doubt, that even after as much as two-thirds of the tongue has been cut off, the mutilated person can gradually regain the power of intelligible speech by means of properly directed practice (Quoted by Kussmaul op. cit., p. 256).

† The above brief account of the vocal apparatus is taken principally from the works of Carpenter, Kirkes, and Bristowe, which I have freely consulted in the preparation of this chapter.

faculty of language, or the power of associating symbols with conceptions, and of exhibiting these symbols to others; there are figurative signs, which are symbols addressed to the eye, just as words are symbols addressed to the ear, this is the natural language of the deaf and dumb. This natural language, in contradistinction to artificial language, is inherent to the nature of our organisation, and is the result of that innate capacity which animated beings possess of giving outward expression to their thoughts and desires. Animals know no other, and the higher animals possess it in a high degree of perfection, and in some of them, all their exterior organs, even to the tail, the ears, and the skin, contribute towards giving expression to what is passing within them.*

Professor Broca's remarks on this subject are so lucid and terse, and of such a philosophical character, that I cannot do better than transcribe them:—"There are several kinds of language; every system of signs which permits the expression of ideas in a manner more or less intelligible, more or less complete, or more or less rapid, is a language in the general sense of the word; thus speech, mimicry, dactylology, writing both hieroglyphic and phonetic, are so many kinds of language. There is a general faculty of language which presides over all these modes of expression of thought, and which may be defined—the faculty of establishing a constant relation between an idea and a sign, be this sign a sound, a gesture, a figure, or a drawing of any kind. Moreover, each kind of language necessitates the play of certain

* I shall consider the highly interesting question of the language of animals at greater length in a subsequent chapter.

organs of emission and reception. The organs of reception are at one time the ear, at another the eye, and sometimes the touch. As to the organs of emission, they are brought into play by voluntary muscles such as those of the larynx, of the tongue, of the velum palati, of the face, of the upper limbs, &c. Every regular language, then, presupposes the integrity:—First—of a certain number of muscles, of motor nerves which supply them, and of that part of the nervous system from which these nerves arise; second—of a certain external sensorial apparatus, of the sensitive nerve which supplies it, and of that part of the central nervous system with which this nerve is connected; third—of that part of the brain which presides over the general faculty of language, such as it has just been defined. The absence or abolition of this faculty renders all kinds of language impossible.”*

It will thus be seen that Articulate Language is by no means the only medium of thought and of expression, for in addition to it, nature has endowed the human race with other interpreters of the condition of the mind, three in number; they are the voice, the countenance, and gesture.

These exist from earliest childhood and amongst all people and races, for although the symbols of articulate language differ in various countries—to such an extent that even neighbouring nations do not understand each other—the signs conveyed by the voice, the countenance, and gesture are ostensibly the same everywhere, notwithstanding the variety of races, and the diversity of languages; they may collectively be termed the *natural*

* “Sur le Siége de la Faculté du Langage Articulé.”

language, in contradistinction to the acquired or *artificial language* or speech; whether this natural language is anterior or not to the symbols of speech in the history of humanity, it certainly takes precedence in the history of the individual, for there is no child that has not cried and laughed long before it spoke.

One of the most striking instances of the extraordinary efficacy of natural language is recorded in the history of Peter the Hermit, who, solely by his voice, his countenance, and his gestures, is said to have swayed and influenced vast multitudes of Crusaders from all parts of the world, who could not understand a word of the language he spoke. The effect thus produced by natural language alone was all the more remarkable as there was nothing in the personal appearance of the hermit to recommend him; in fact, he is described in Mills' History of the Crusades, as "*statura pusillus, et quantum ad exteriorem hominem, personæ contemptibilis.*"*

It is evident that the great Roman orator was fully alive to the immense advantages to be derived from the systematic cultivation of this natural language when he

* "Thus spake the Prince : meanwhile his ardent eyes

The Hermit Peter lifted to the skies ;

His voice, his colour were no more the same ;

His rev'rend visage beam'd with holy flame,

Pure, warm, sublime ; with zeal prophetic fir'd,

And fill'd with rapture, as his God inspir'd,

With angels he convers'd, and soaring high

Pierc'd the thick veil of dark futurity.

Fill'd with unwonted awe and mute surprise,

All on his gloomy features fix'd their eyes,

All on his alter'd voice attentive hung

While hints mysterious thunder'd from his tongue."

Tasso. *Jerusalem Delivered*, Canto x. 645.

said:—"Nature has given to every passion its peculiar expression in the voice, the countenance, and the gesture; and the whole body of a man, his look and voice respond to the passions of the mind, as the strings of a musical instrument to the fingers that touch them."* Our own great dramatist was fully sensible of the power of natural language as shown by the following passage:—

"There's language in her eye, her cheek, her lip,
Nay, her foot speaks, her wanton spirits look out
At every joint and motive of her body."†

Long before articulate language is roused into action, the voice has already become the faithful echo of the passions of the mind or of the feelings of the body, which it reveals by its pitch and tone, by its various kinds of cry, sob, and laughter. Our poet laureate has embodied the above idea in the following well-known lines:—

"An infant crying in the night,
An infant crying for the light,
And with no language but a cry."‡

Although nature has not denied eloquence to other parts of the body, she has made the countenance of man the most expressive and faithful mirror of his mind. In reference to this subject, Bacon says, "We are not to be influenced by the old adage '*Fronti nulla fides*,' for

* Omnis enim motus animi suum quemdam a natura habet vultum, et sonum et gestum: totumque corpus hominis, et ejus omnis vultus, omnesque voces, ut nervi in fidibus, ita sonant, ut a motu animi quoque sunt pulsæ.—Cicero, "De Oratore," lib. iii. 57.

† Shakespeare, "Troilus and Cressida," act iv. scene 5.

‡ Tennyson, "In Memoriam," 54.

although this may apply to the general composition of the countenance, there are certain subtle movements of the eyes, mouth, and face by which the door of the mind is unlocked and opened."* The natural language of the physiognomy is a theme in which the fancy of the poets of all countries has revelled.

“Ἦκουσε μητρὸς καπιθεῖς ὑγρὰν χέρα,
Φωνὴν μὲν οὐκ ἀφῆκεν, ὀμμάτων δ’ ἄπο
Προσεῖπε δακρύοις, ὥστε σημῆναι φίλα.”†

“Sæpe tacens vocem, verbaque vultus habet.”‡

“Your face, my Thane, is as a book, where men
May read strange matters.”§

“Au seul nom de César, d’Auguste, et d’empereur,
Vous eussiez vu leurs yeux s’enflâmer de fureur ;
Et dans un même instant, par un effet contraire,
Leur front pâlir d’horreur, et rougir de colère.”||

This language of physiognomy all men possess, and all understand it when employed by others. When the mind is tranquil, all parts of the countenance are in a state of repose, but when the mind is agitated, the human face becomes a living picture in which the passions are represented with the utmost faithfulness and precision ; not only does the face act as a whole, but in an isolated manner ; for each region and each muscle speaks its own language, and forms its own peculiar feature in the pictorial representation—each kind of thought, sentiment,

* “De Augmentis Scientiarum,” lib. viii., p. 773.

† Euripides, “Phœnissæ,” 1448.

‡ Ovid, “Ars Amat.,” lib. i., 574.

§ Shakespeare, “Macbeth,” act i., scene 5.

|| Corneille, “Cinna,” acte i., scène 3.

and feeling, finds in these organs its appropriate expression, and from the conjoint or separate action of these muscles, are represented all the various modifications of joy, sorrow, love, contempt, pride, anger, and fear.*

A third method of human expression independent of speech is gesture, which is the natural language of the deaf and dumb, and which is adopted amongst all nations, when, from ignorance of the language of a foreign race, they are obliged to communicate without an interpreter.

A theory has been mooted that gesture was the original language of man, and that articulate speech came afterwards. A discussion upon this point would lead me to the question of the origin of language, about which so much has lately been written; and as it does not lie in the direct line of my investigations, I refrain from treading upon this dangerous ground, further than to remark that as all points to the belief that primæval language must have been widely different from that of modern civilization, and that its present state of perfection is the result of a slow and gradual development,

* Whilst this chapter is passing through the press, my attention has been called to the systematic use of the language of physiognomy in judiciary proceedings in France.

In describing the office of the *juge d'instruction*, before whom a suspected person is brought in the first instance, it is stated that "the seat of the magistrate is placed in such a manner that he who occupies it turns his back to the light, in order that he may observe the least change in the countenance of the prisoner, who may betray himself as easily by a gesture, by an attitude, by a look, or by a sudden blush, as by the utterance of articulated words; and often an unexpected question put to a criminal, who up to that time had been '*impénétrable*,' has sufficed to enlighten the judge."—*Le Soleil*, 9 *Juin*, 1887.

I have no hesitation in adopting the conclusions of the Archbishop of York, who, in speaking of language says that "the power, and not the results, of its exercise—the germ, and not the tree, was imparted."*

The system of representing objects and ideas by gesture constitutes a means of expression often successfully employed by those who are unacquainted with the conventional signs of one another's spoken language; it is addressed to the eye instead of to the ear as in speech, and consequently becomes an easy mode of communication where the latter medium cannot be adopted.† There cannot be a doubt that gesture may become a most powerful exponent of the condition of the mind, and one writer of the 17th century, Isaac Vossius, has grotesquely exaggerated its value by deliberately preferring it to articulate speech; and he maintains that more can be expressed by the hand than by the tongue! This author even expresses regret that the whole human race does not banish "the plague and confusion of so many tongues," and adopt an universal and self-evident system of signs and pantomimic expressions; he even seems to envy the capabilities of the members of the brute creation, whose condition in this respect, he says, is superior to that of man, inasmuch as the lower animals,

* "Outline of the Laws of Thought," 47.

† In his "Researches into the Early History of Mankind," Tylor has an interesting chapter on gesture-language, in which he says that "among the Cistercian monks there exists, or existed, a gesture-language. As a part of this dismal system of mortifying the body, they held speech, except in religious exercises, to be sinful; but for certain purposes relating to the vile material life that they could not quite shake off, communication among the brethren was necessary, so the difficulty was met by the use of pantomimic signs. A great part of the Cistercian gesture-signs are either just what the deaf-and-dumb would make, or are so natural that they would at

without an interpreter, are better able to give expression to their feelings than any human beings, especially if the latter employ a foreign tongue.*

A German writer, Kleinpaul, regards it "as a mere accident that phonetic speech (*Lautsprache*) has come so exclusively into use, since it cannot be doubted that, if gesture-speech (*Geberdensprache*) had been developed

once understand them. Thus, to make a roof with the fingers means 'house;' to grind the fists together is 'corn;' to 'sing' is indicated by beating time; 'fire' is shown by holding up the fore-finger and blowing it out like a candle; 'salt' is indicated by taking an imaginary pinch and sprinkling it; 'butter' by the action of spreading it on the palm of the hand."

This mode of communication which Tylor assigns to the Cistercians, I am informed applies with as much force to the Carthusians, and, in fact, more or less to all monastic orders and catholic communities, where periods of strict silence are enjoined; gesture-language being thus put into requisition. In the present day, at Parkminster in Sussex, there is a Carthusian monastery where strict silence is one of the rules of the order, and gesture-language is in full force.

* As this curious and somewhat rare work is not of easy access to most readers, I give the views of Vossius in his own words:—"Si vel solam spectemus manum, equis negare possit, eam motus habere magis conspicuos et apertos quam ulla habeat lingua, cum nullis coerceatur claustris, et in omnes formas et figuras sit explicabilis? Literas quidem illa et articulata vocabula depromere nequit, sed profecto si tantundem laboris, ac fit in perdiscendo aliquo sermone, arti impendamus pantomimicæ, haud minus forsân claré animi nostri sensus aperire liceret, ac nunc linguæ facimus beneficio. Nec quidquam felicitati humani generis decederet, si pulsa tot linguarum peste et confusione unam hanc artem omnes callerent mortales, et signis, nutibus, gestibusque licitum foret quidvis explicare. Nunc vero ita comparatum est ut animalium quæ vulgo bruta creduntur, melior longe quam nostra hac in parte videatur conditio, utpote quæ promptius, et forsân felicius, sensus et cogitationes suas sine interprete signifîcent, quam ulli queant mortales, præsertim si peregrino utantur sermone."—Is. Vossius, *De Poematum Cantu et Viribus Rythmi*, pp. 65, 66. *Oxon*, 1763.

by a long use of many centuries in the same way as phonetic speech, it would scarcely have been inferior to the latter in completeness, convenience, and variety. Deaf-mutes, he maintains, are able to produce a scene of Shakespeare in the language of signs.”*

Numerous instances are recorded by various authors of the advantages of gesture, an art in which the professional mimes of Greece and Rome especially excelled.

Lucian, in his chapter on Dancing, which is a panegyric on the art of pantomime, after stating that the mimical dancer must possess an accurate acquaintance with various sciences, including geometry, adds that, like Homer’s Calchas, he must know all that is, that was, and that shall be hereafter—“Τὸν ὀρχηστὴν εἰδέναι χρὴ τὰτ’ ἔοντα, τὰτ’ ἐσόμενα, πρότ’ ἔοντα.”

He mentions several instances of the wonderful talent possessed by a pantomimic dancer in the time of Nero, of which the following is perhaps the most striking:—The famous cynic Demetrius having inveighed in very strong terms against the inutility of the art of dancing, a certain famous mimic, who united to his eminent talent an accurate acquaintance with mythology, asked Demetrius to see him dance, before he passed a verdict upon his art, promising that he would exhibit his pantomime without flutes or singing. Demetrius con-

* Quoted by Kussmaul, *op. cit.*, Cap. v. II. Kussmaul whilst recognising the interesting support which Kleinpaul gives to the theory of the remarkable capability of development inherent in gesture-language, is constrained to add that the latter has failed to convince him of the identity in value between gesture-speech and that of phonation; and whilst admitting the possible development of dramatic capabilities in the deaf-mutes, he is sceptical as to the power of gesture-language to raise up amongst them a Shakespeare!

sented ; the dancer ordered the musicians and singers to be silent, and without any accompaniment of words or music, portrayed by his dancing the loves of Venus and Mars, with all their scenes ; how Helios betrayed them to Vulcan ; how the latter watched them and caught them both in his net ; the gods standing by ; Venus blushing and Mars frightened ; in short, all that is contained in this history or has reference to it ; and he performed all this with so much dexterity, that Demetrius, transported with delight, called out to the dancer, “I not only see, but I hear all your performance, for you seem to speak to me with your hands—‘*Ἀκούω ἄνθρωπε ἃ ποιεῖς οὐχ ὁρῶ μόνον ἀλλὰ μοι δοκεῖς ταῖς χερσὶν αὐταῖς λαλεῖν.*’”*

A similar instance of the extraordinary development of the power of expressing thought by signs and gestures is related by Ælianus :—A tyrant, by name Tryzus, with the view of preventing conspiracies and treasons against himself, commanded that his subjects should not speak together either in public or private. Hereupon they evaded the tyrant’s command, and signified their thoughts to each other by the action of the eyes, of the hand, and of the head. The tyrant, conceiving that although they had complied with his order as to silence, their gestures and looks betokened ill towards himself, forthwith prohibited this mode of intercourse. Hereupon one of them went into the forum, and without speaking a word wept bitterly ; he was soon surrounded by a number of his fellow-citizens, who also burst into tears. When the news was brought to the tyrant that the inhabitants, although they had ceased to use signs, wept grievously,

* Lucian, ΠΕΡΙ ΟΡΗΣΕΩΣ, 36, 63.

the edict went forth that they were not to be allowed to give expression to their feelings by weeping. As a result of this last act of despotism, the inhabitants, snatching the weapons from the hands of his guard, killed the tyrant.*

Macrobius informs us that Cicero and Roscius the actor were in the habit of vying with each other, to see which of the two could best express the same ideas, the orator by speech, or the player by mimicry or gesture; and that the result of these experiments was such as to give Roscius so exalted an opinion of his art, that he wrote a book for the express purpose of comparing oratory with acting.†

The gradual transition from *natural* to *artificial* language is well exemplified by watching the proceedings of early childhood. The child learns to speak from unconscious impulse, which is directed and controlled by the intelligent co-operation of the parent; the child points to certain objects and persons, this being a sign of recognition of something that had previously made an impression on the optic nerve—in fact, a proof is given of the existence of the faculty of memory; or, as Kussmaul says, “he is impelled by feelings and pictorial intuitions (*bildliche Anschauungen*) which gradually become elevated into intelligent conceptions (*begrifflichen Vorstellungen*); thus we may regard speech in its earliest stages as an *acquired reflex*.‡ The parent

* *Ælianus*, Hist. Var. xvi. 22.

† Macrobius, Sat., lib. ii., c. x., 251

‡ “Die Störungen der Sprache,” s. 5. Under the head of Movements of Expression (*Ausdrucksbewegungen*), Kussmaul includes the various methods by which outward expression is given to the inward mental processes.

now steps in, and the child is taught to connect certain objects and persons with certain conventional signs or symbols called words, and in order to effect this, the auditory apparatus must concur, and speech is the result—the child has learned that a sound uttered by the tongue and recognised by the ear, is thenceforward to represent to his mind a thought, and the faculty of articulate language is for the first time roused into action.

Those which constitute *natural language*, such as the play of the features, screaming, weeping, and laughing, he calls *congenital reflexes*; whereas speech, the *acquired reflex*, must be learned, and is the outcome of practice.

In the same chapter, Kussmaul enounces his views of the automatism of the brain, and he suggests that the *acquired reflex* is nothing but a play of mechanical contrivances learned by rote; and he institutes a comparison between the mechanism of speech and a telegraphic apparatus. "Pantomimic acts and spoken and written words," says he, "are nothing but the internal products of self-regulating mechanisms, which are set in ordered motion by feelings and conceptions (*Gefühle und Vorstellungen*), just as one can set going a sewing machine without knowing its construction; and it is evident that in this lies the best guarantee for the even working of these movements, and for the accurate and rapid course of speech. The will finding everything already prepared, has simply to employ the preformed and well-schooled mechanism to carry out its designs, a task thus rendered easy of accomplishment. Just as a general when arranging the hundred thousand members of his well-organised and well-disciplined army, has only to give his orders generally and comprehensively, so we, for the execution of the most complex series of movements of our organs of speech, merely need the expression of a thought by this word or by that sentence, in order actually to utter it. Happily for us, we have not therefore to trouble ourselves about the details necessary for the working of the innumerable internal telegraphic stations. If our despatch is properly drawn up and handed in, and the organisation is in good order, we may be sure it will reach its address."

Further on, at page 8, he says that it is certain that speech is learned only by onomatopœsis; and that the child imitates the words of its mother, in the same way that it imitates the barking of a dog or the bleating of a sheep.

Certain conditions, however, are indispensable for the development of articulate language:—1st, there must be integrity of thought, or, at all events, an idea must be conceived; or, as the late Mr. Dunn elegantly remarked, “must be moulded for expression in the seat of intellectual actions.” 2nd, there must be a connection between the idea conceived, and the conventional signs or symbols which constitute the verbal forms of language. 3rd, the idea being conceived and the verbal form found, there must be integrity of the commissural fibres and of the motor centres through which the volitional impulses operate in speech, and the muscles of phonation and of articulation must be able to obey the mandates of the will. 4th, it would seem that all these conditions may exist, and yet there may be aphasia or dysphasia. One of my own cases, that of Anna Maria Moore, is a good illustration of this fact; she had plenty of ideas, she knew the symbols which corresponded to them—the representative signs of her thoughts; the muscles of phonation and of articulation were unaffected, the vocal apparatus was intact, but the artist was unable to make use of it,* she seemed like an accomplished musician, who, although accustomed to perform rapid and difficult passages upon his instrument with the greatest ease and without any conscious effort, suddenly finds himself, under certain unfavourable conditions of excitement or from the abuse of alcoholic stimulants, only able to produce discordant strains—there lacks our fourth condition,

* Professor Brown-Séquard, in calling attention to the fact that in many cases the patients are unable to articulate, although they can move the tongue and larynx in every direction and can utter sounds very well, remarks, that in such cases the mental part of the mechanical act is lost, and not the mechanical action itself.

the master mind, or what has lately been called *the power of co-ordination*, which consists in the ability of combining and regulating the delicate movements of the organs of articulation, in such a manner, as to be able without effort to give outward expression to the word-symbols representing the ideas conceived.

The child is taught to speak as he is taught to walk, and he only speaks because he has been taught ; what he has learned to do he can forget, and aphasia may be the result of the loss of the memory of the movements necessary for the articulation of words ; thus it would seem that one can become aphasic in two ways, either by losing the memory of the symbols of language, or by forgetting the mechanical movements necessary to give expression to such symbols.

If it should occur to any of my readers that I have in this chapter dwelt at too great length upon the various modes of expression with which nature has endowed mankind, in addition to that of articulate speech, I would remark that the study of the Natural Language of Voice, Physiognomy, and Gesture has not hitherto received that attention which its importance deserves ; it has a direct connection with the various forms of disturbances of speech that I am considering in these pages, the pathology of which we shall now be better able to understand.

CHAPTER VI.

Classification. Discussion at the British Association at Norwich, 1863. Varieties. Aphasia may be complete or partial, permanent or intermittent. Is sometimes limited to substances; sometimes to proper names—Thucydides, Baron Larrey's celebrated case of gunshot wound. Defect may be limited to a particular language. Recurring utterances from "fossilisation" of impressions. May be the sole morbid symptom. Heterophasia or Paraphasia. On Agraphia or loss of the faculty of written language. On Mirror-writing, or the reversal of the normal position of the letters. Greek Epigraphy—Welsford, Roberts. Remarkable echo case.—A human parrot. The language of Physiognomy.

Classification.—The various authors who have written on loss or lesion of speech have each adopted a different classification. I have already alluded to the three divisions of Dr. Jules Falret; M. Jaccoud makes five;* Dr. Popham, of Cork, says that two typical forms are to be discriminated—*Lethological or Amnesic Aphasia*, and *Aneural or Ataxic Aphasia*; adding that to these two forms there are cognate states, between which and them it is not easy at times to draw the line of demarcation.†

The idea of this division has been further amplified by Dr. William Ogle, in the admirable essay to which I have before alluded, in which he defines by the term *Amnemonic Aphasia* that form characterised by loss of the memory of words—by inability to translate ideas into symbols; but besides this, he says, a second act of

* "Gazette Hebdomadaire," 1864.

† "On Aphasia," p. 5.

memory is required, closely connected with the former, yet distinct from it. "Not only must we remember words, but we must also remember *how to say them*. The mere memory of words by itself may produce an inward repetition or mental rehearsal of a phrase, but it can do no more; for the utterance of the phrase in articulate sound, this second memory is absolutely requisite." To the failure of this second memory Dr. Ogle gives the name of *Atactic Aphasia*, adding that the loss of speech is due to the want of the co-ordinating power over the muscles of articulation.*

At the annual meeting of the British Association, held in Norwich, in August, 1868, Professor Broca, in proposing the adoption of a more precise terminology for expressing the various forms of defective speech, suggested the following divisions:—*Alogia*, loss of speech from defective intelligence; *Amnesia*, from defective memory of words; *Aphemia*, from a defect in the special faculty of language; and *Alalia*, from defective articulation.†

Kussmaul combines all disturbances of speech under the name of *Lalopathia*, but as he says, speech, as an autonomous process, consists of articulation and diction, he recognises two divisions, under the heads respectively

* St. George's Hospital Reports, Vol. 2, 1867, p. 95.

† One of the most interesting features of the Norwich meeting—at all events, to the medical profession—was the discussion which followed the reading of papers on Aphasia by Dr. Hughlings Jackson, Mr. Dunn, and M. Broca. The learned Parisian Professor, with great force and eloquence, expounded before a British audience, his own peculiar views as to the seat of speech, illustrating his remarks by a coloured diagram, and a plaster cast. A most animated debate ensued, in which Professor Hughes Bennett, Professor Humphry, Dr. Crisp, Sir Duncan Gibb, Professor Carl Vogt, and others took a part. It may be said of this discussion—*Tot homines tot sententiæ*.

of Dysarthria and Dysphasia, according as articulation or diction is affected.

Professor Charcot, in his lectures, recognises two principal divisions, corresponding with what he terms *the passive and active phase of the faculty of language*; the passive phase consisting of the auditive and visual memories, or phenomena of reception, by which phonetic and graphic symbols are recognised; the active phase comprising the reproduction of the said symbols by articulate language, or by writing—the phenomena of transmission. He thus establishes two classes, according as the obstacle or defect is in the process of reception or of transmission, thus:—

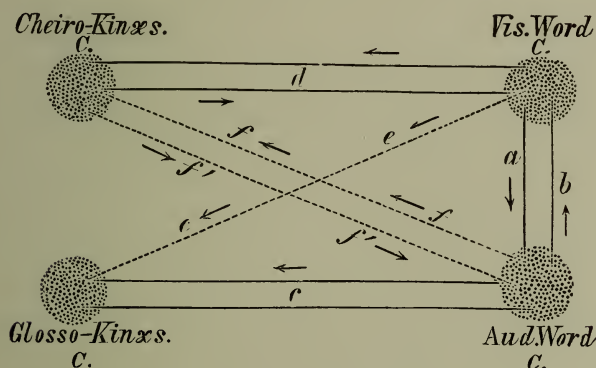
- | | |
|---|---|
| A. Aphasia of Reception
or Sensory, | } Hearing = Word-Deafness.
} Sight = Word-Blindness. |
| | |
| B. Aphasia of Transmission
or Motor, | } Speech = Motor Aphasia (Bouillaud-
} Writing = Agraphia. Broca type). |
| | |
| C. Sensori—motor Aphasia | { From loss of the memory of the mechanism of speech.
} From loss of the memory of the mechanism of writing. |
| | |

The pathology of sensory aphasia may receive some elucidation from a brief summary of Dr. Bastian's views of the different types of verbal amnesia, as set forth in an elaborate and highly philosophical essay lately published, in which he recognises three varieties of verbal memory:—

1. *Auditory Memory*.—The memory of the sounds of words, that is, of the auditory impressions representative of different words.

2. *Visual Memory*.—The memory of the visual appearances (printed or written) of words, that is, of the visual impressions corresponding with different words.

3. *Kinæsthetic Memory*.—(a) The memory of the different groups of sensory impressions resulting from the mere movements of the vocal organs during the utterance of words (impressions from muscles, mucous membrane, and skin); that is, of the kinæsthetic impressions corresponding with the articulation of different words, which I propose to speak of as glosso-kinæsthetic impressions. (b) The memory of the different groups of sensory impressions emanating from muscles, joints, and skin, during the act of writing individual letters and words; that is, of the kinæsthetic impressions corresponding with the writing of different letters and words, which I propose to speak of as cheiro-kinæsthetic impressions. These several centres are also closely connected with one another by commissural fibres, so that the memory of a word or the recollection of a word in one or other of these modes, doubtless involves some amount of simultaneously revived activity in one or two of the other word-centres.



Aud. W. C., the auditory word centre; *Vis. W. C.*, the visual word centre; *Glos. Kinæs. C.*, the glosso-kinæsthetic word centre; *Chi. Kinæs. C.*, the cheiro-kinæsthetic word centre; *a*, the visuo-auditory commissure; *b*, the audito-visual commissure; *c*, the audito-kinæsthetic commissure; *d*, the visuo-kinæsthetic commissure; *e, e'*, the visuo-glosso-kinæsthetic commissure; *f, f'*, the cheiro-kinæsthetic-auditory commissure; *f'', f'''*, the audito-cheiro-kinæsthetic commissure. The last three commissures represent unusual routes for the transmission of stimuli between the word centres.

A lesion confined to the auditory word centre would give us that form of auditory amnesia known as "word-deafness"; a lesion of

the visual word centre would give us the form of visual amnesia known as "word-blindness"; a lesion of the glosso-kinæsthetic word centre would produce that kind of kinæsthetic amnesia met with in pure aphasia; while a lesion of the cheiro-kinæsthetic word centre would give us that other kind of kinæsthetic amnesia met with in pure agraphia.*

Although I have found it useful to adopt the terms *Amnesic* and *Ataxic Aphasia*, &c., in the description of my own cases, I do not wish to fetter myself with any system of classification, which must, to a certain extent, be artificial: I propose, however, under the head of "*Varieties*," to mention the principal forms of the affection which are most commonly met with by the clinical observer.

Varieties.—There is a great diversity in the particular type or form in which lesion of speech may show itself, for as it is a symptom and not a *morbis per se*, we cannot expect to find the same uniformity in its manifestation as is to be met with in the description of a specific and well characterised disease; having no uniform cause, it has no regular stereotyped march, being only a secondary pathological phenomenon, the result of single or multiple organic lesions. It is, therefore, impossible to construct any logical system of classification, still it may help to guide us to a better understanding of our subject, if I adopt an arrangement of some kind, however arbitrary and artificial it may be.

* *British Medical Journal*, Oct. 22nd, 1887. "On Different Kinds of Aphasia," by H. Charlton Bastian, F.R.S. By the courtesy of Dr. Bastian I am enabled to reproduce the diagram explanatory of his views.

1.—It may differ in degree, from absolute speechlessness to various grades of imperfection in the use of the faculty of language; it may be an ephemeral and intermittent symptom, lasting a few days, a few hours, or even a shorter period, and leaving no trace, or, it may be a permanent defect.*

2.—In one variety the defect is limited to substantives generally, of which I have recorded several examples in the preceding pages (Bergmann, Graves, &c). In many of these cases, the defect is supplied by a paraphrase, as was observed in Dr. Bergmann's case, where the patient, being unable to say scissors, said *it is what we cut with*. The idea is present, but the word is wanting; a good illustration of this condition was shown by W. Sainty, whose case I have described so minutely (page 100). When I showed him a poker, and asked him what it was, he answered, "I know what it is, and what it is used for, but I cannot say the word." On being asked whether it was a walking stick or a broom, he said, "No"; but immediately the word "poker" was mentioned, he recognised it as the word-symbol corresponding to his idea of the object presented to him.

In further illustration of this variety I would refer to a case reported by M. Piorry, in which an old priest,

* Heubner, in describing the disturbance of language which sometimes occurs in cerebral syphilis, says, "The incapacity for speech varies much from time to time, and the patient can often, when unconstrained, succeed in doing what he is no longer able to do in society, or before the examining physician. This all proves that we have to do with a disturbance seated beyond the prime motor centres—a weakness of those organs from which the stimulus proceeds to set these centres in motion—organs, therefore, which we must locate in the grey substance of the cerebrum."—*Ziemssens Cyclopædia*, v. 12, p. 821.

after an attack of dextral paralysis, had entirely lost the faculty of employing substantives ; the manner in which he expressed himself was most curious—for instance, if he wished to ask for his hat, this unfortunate word hat failed him entirely, and he made use of verbs, pronouns, and adjectives in order to render his idea. “Donnez-moi . . . ce qui se met sur la . . . mais le mot tête ne lui venait pas ; il cherchait vingt fois à exprimer sa pensée, et la chose lui présentait une difficulté insurmontable.”*

It is indeed singular that substantives and proper names, which are first acquired by memory in childhood, should be sooner forgotten than verbs, adjectives, and other parts of speech which are of a much later acquisition. In noticing this peculiarity, Dr. Osborne offers as an explanation, that nouns are less frequently repeated than verbs or prepositions, which, being in use on every topic which can form the subject of discourse, are retained, when the names of general topics as nouns, or of individual topics as proper names, are forgotten.†

3.—Some persons have only lost the power of saying their own name (Crichton), or the names of other people ; it is not uncommon to find persons whose conversation is perfect with the single exception that they cannot evoke or call up in their mind certain individuals—they

* Gazette des Hôpitaux, May 27, 1865. At the autopsy of this patient, M. Piorry found in the anterior part of the left corpus striatum three apoplectic cysts.

† “On the Loss of the Faculty of Speech.” Dublin Journal of Medical Science, Nov., 1833. This, after Crichton’s, is one of the earliest memoirs on our subject which have come under my notice, and contains several highly interesting and well recorded cases.

lack the symbol necessary to convey the idea, and their inability in this respect is as complete as if an entire leaf had been torn out from the book of memory; it may, perhaps, be said that this defect is only one of the signs of senile decay—of the failing memory of elderly people; this view, however, does not furnish any explanation of the fact of the defect being limited to proper names; besides, this form occurs in others than in elderly people, and is probably due to the fact that proper names, only denoting individuals and not qualities, do not get incorporated with phrases in which they are constantly occurring spontaneously.*

Thucydides mentions that many who suffered from the plague which raged at Athens, found, on recovering, that they had not only forgotten the names of their friends and relations, but also their own names.* Pliny, the naturalist, also relates that Messala Corvinus, the orator, could not recall his own name.†

I have already, at page 53, cited a remarkable instance of this singular defect as recorded by Crichton; and the following case has come under my own personal observation:—Mr. T. W. B., aged 70, sub-editor of a newspaper, after an attack of paralysis, could not remember my name; and he told me, moreover, that on one occasion, he left his house with the intention of going to the railway station to meet a friend, intending to take a cab at the station; whilst walking along, it occurred to him

* “Les termes n'ont pas une liaison nécessaire avec les idées; on veut parler d'un homme qu'on connaît beaucoup, dont le caractère, la figure, le maintien, tout est présent à l'esprit, hors son nom qu'on veut nommer, et qu'on ne peut rappeler.”—Vauvenargues. *Introduction à la connaissance de l'esprit humain.* Livre. i., ch. xiii.

† Thucyd. *Hist. Lib. ii. 49.*

‡ Plin. *Lib. vii. 24.*

that he was unable to recall his own address, so as to be able to tell the cabman where to conduct him; he, therefore, returned to his home to ask his daughter where he lived, and he was able to retain this information just long enough to make it available when he reached the station to meet his friend.

Under the title of "Wound of the brain, with loss of the memory of substantives," Baron Larrey, 60 years ago, made the following important communication to the Academy of Medicine of Paris.

A sub-officer of dragoons was shot in the head at the battle of Waterloo. There was copious hæmorrhage from the wound, and for a considerable time loss of consciousness. He remained, together with several other wounded Frenchmen, without any assistance, on the field of battle for the space of two days and two nights, and it was only at the end of the second day that he was picked up by a resident of Brussels, and placed under surgical treatment.

It was then found that a ball had entered the left frontal region, about six or eight millimetres from the eyebrow, at a point corresponding to the temporal ridge. The wound was enlarged, and an attempt made to extract the foreign body; it was found, however, that the ball had entered the cranial cavity to the extent of half its circumference, and the other half was so wedged into the frontal bone, that it was not possible to dislodge it, except by trephining, to which the patient would not consent. There was right hemiplegia, which gradually disappeared under appropriate treatment, and he was soon able to resume active service as a sergeant in an infantry regiment.

As far as his intellectual faculties were concerned, there was no derangement, except that he was unable to employ substantives or proper names in his conversation. Thus, in his capacity of instructing sergeant of his company, it was his duty to explain the different movements of the drill, and also to describe the various parts that enter into the composition of a gun; to accomplish this, he was obliged to refer to his drill-book in order to find the names

of the objects he was describing. He could also distinguish the soldiers of his company by their height, figure, complexion, or the sound of their voice, but he could not call them by name.

Nature gradually accommodated itself to the presence in the cranium of this foreign body, and beyond this inability to recall proper names and the names of objects, there remained no other infirmity, and the patient lived for twelve years, and eventually died of phthisis.

Autopsy.—The ball was found embedded in the substance of the frontal bone, with signs of fracture of the internal table; the dura mater was strongly adherent to the whole of the left anterior cranial fossa; it was much thicker, more dense than in the normal condition. A spheroidal excavation of about seven or eight centimetres in depth, and five centimetres in its horizontal diameter, was discovered at the summit, and on the temporal side, of the left anterior lobe of the brain. This excavation was lined with a fine reddish membrane which appeared to be the continuation of the pia mater. The subjacent cerebral substance was healthy, as well as the rest of the brain. The right hemisphere was one-sixth larger than the left; the four ventricles and the spinal canal were filled with limpid serum.*

The above observation is all the more interesting, as Napoleon's great surgeon lived long before the attention of the profession was directed to the question of cerebral localisation, and consequently he wrote without any preconceived notions upon this much controverted subject.

4.—Perhaps one of the most curious forms in which imperfection of speech shows itself, is where the defect is limited to some particular language, which is completely sponged from the tablet of memory, while other languages remain indelible; thus, Dr. Beattie (quoted by Dr. Scoresby Jackson) mentions the case of a gentle-

* Journal de Physiologie de Magendie, tom viii., 1828.

man, who, after a blow on the head, lost his knowledge of Greek, and did not appear to have lost anything else. Dr. S. Jackson asks—where was that gentleman's Greek deposited, that it could be blotted out by a single stroke, whilst his native language and all else remained?*

Dr. Scandella, an Italian, who died at New York in 1789, was master of the Italian, French, and English languages; in the beginning of an attack of yellow fever of which he died, he spoke English only; in the middle of his illness he spoke French only; but on the day of his death, he spoke only in the language of his native country.

Professor Béhier's case, which I have quoted at page 30, is a further illustration of this variety, his patient having entirely lost the use of two out of three languages that she had acquired.

In the year 1886, I had occasion to see in the neighbourhood of Paris, in consultation with Dr. de Beauvais, an elderly English gentleman, who was the subject of complex aphasia, one feature of which was an inability to speak French, although that was the language which he habitually used during his 45 years residence in France.

Dr. Rush, an American physician, in treating of similar disturbances of speech, says:—"There is an oblivion of the names of substances in a vernacular language, and a facility of calling them by their proper names in a dead or foreign language. Dr. Johnson, when dying, forgot the words of the Lord's prayer in English, but attempted to repeat them in Latin. Delirious persons often address their physicians in Latin, or in a foreign tongue."†

* "Edinburgh Medical Journal," February, 1867.

† "Medical Inquiries and Observations upon Diseases of the Mind." Philadelphia, 1830, p. 274.

As a cognate subject, I wish to call attention to the fact, that not only may a language be lost, but, that in the ravings of delirium it may also be revived, as shown by the following case recorded by Coleridge.

In a Catholic town in Germany, a young woman of four or five and twenty, who could neither read nor write, was seized with a nervous fever, during which she continued incessantly talking Latin, Greek, and Hebrew, in very pompous tones, and with most distinct enunciation.

The case had attracted the particular attention of a young physician, and by his statement many eminent physiologists and psychologists visited the town, and cross-examined the case on the spot. Sheets full of her ravings were taken down from her mouth, and were found to consist of sentences, coherent and intelligible each for itself, but with little or no connection with each other. Of the Hebrew, a small portion only could be traced to the Bible, the remainder seemed to be in the rabbinical dialect.

All trick or conspiracy was out of the question ; not only had the young woman ever been a harmless, simple creature, but she was evidently labouring under a nervous fever. Inquiries having been made as to the antecedents of this girl, it was ascertained that she had formerly lived as servant to an old Protestant pastor, a very learned man, and a great Hebrew scholar. It had been the custom of this worthy divine to walk up and down a passage of his house into which the kitchen door opened, and to read to himself, with a loud voice, out of his favourite books, which consisted of rabbinical writings, together with several of the Greek and Latin fathers ; from these works, so many passages were identified with those taken down at the young woman's bedside, that no doubt could remain concerning the true origin of the impressions made on her nervous system.*

* Coleridge. "Biographia Literaria," Vol. I., p. 112. In commenting upon this strange history, Coleridge thus soars into the region of metaphysics :—"This authenticated case furnishes both proof and instance, that relics of sensation may exist for an indefinite time in a latent state, in the very same order in which they were originally impressed ; and as we cannot

The above case, and others of a similar character, that have been brought under my notice, would lead to the inference that impressions made upon our consciousness are registered by some change in the condition of the brain, which is consequent upon their reception; and they also tend to show that the presence of a morbid poison may be the means of resuscitating memories that had long since vanished from the conscious mind.

5.—In another class we find patients substituting one word for another; thus Crichton mentions a patient who would ask for his boots when he wanted bread; the gentleman whose case was observed by Sir Thomas Watson, would say “pamphlet” for camphor; and in one of my own cases—that of C. M.—the patient would say “poker” when he meant the fire. In this erratic speech the defect is sometimes limited to the substitution of one letter for another, as in a case quoted by Crichton, where, after recovery from a fever, one of the first things the patient (a German) desired to have was coffee (kaffee); but instead of pronouncing the letter f, he substituted in its place a z, and therefore asked for a cat (kazze), and in every word which had an f, he committed a similar mistake, substituting a z for it.* Dr. Popham, of Cork, cites a similar example.

rationaly suppose the feverish state of the brain to act in any other way than as a stimulus, this fact contributes to make it even probable, that all thoughts are in themselves imperishable; and that, if the intelligent faculty should be rendered more comprehensive, it would require only a different organisation, *the body celestial*, instead of *the body terrestrial*, to bring before every human soul the collective experience of its whole past existence. And this, perchance, is the dread book of judgment, in whose mysterious hieroglyphics every idle word is recorded!” Page 115.

* “An Inquiry into Mental Derangement,” vol. i., p. 373.

6.—A certain number of aphasics use stereotyped phrases, always the same, their formula of utterance being a constant repetition of a word or words, which they employ apparently indifferently, in reply to any question put to them; thus we have seen in one of Trousseau's cases, that the person thus addressed, invariably replied "*n'y a pas de danger*;" in Hasbach's case the phrase "*gerechter Gott*" was the only one at the command of the patient; the lady whose clinical history I have detailed at page 151, and who was the subject of puerperal aphasia, could only utter three words, "*The other day*," and these she employed in reply to every question put to her. Others can only pronounce certain monosyllables—in one of Professor Broca's cases the word "*Tan*," and in one of M. Charcot's the word "*Ta*," composed the entire vocabulary of the respective patients; and in one of Dr. S. Jackson's of Pennsylvania, we have seen that the clergyman thus affected, who was totally deprived of articulate speech, could write only the unintelligible phrase, "*Didoes doe the doe*."

In many of these cases, the play of the physiognomy shows that the sense of a question is perfectly understood by the patients; they have not lost the general faculty of language, for they understand written and articulate language when spoken by others; they preserve even the sense and the value of words, both in the auditive and graphic form; what is wanting in them is not the concurrence of the nerves and muscles engaged in phonation and articulation—for they can pronounce certain syllables spontaneously, and can sometimes repeat what is said to them—there is, however, wanting a particular faculty which we may call the faculty of articulate language; or, according to some authors, the

faculty of co-ordinating the movements necessary for the production of articulate language is deficient.

In most instances the patient can immediately correct himself upon being prompted ; Crichton, however, mentions the case of a lady who thus substituted one word for another, but who exhibited the singular peculiarity, that when the proper expression of her thought was mentioned to her, she was unable to pronounce it.

It has been suggested that these '*recurring utterances*' are the repetitions of the last words that were being spoken, or that were about to be spoken, when a cerebral break-down set in ; the theory being that "whenever we utter, or whenever we formulate for utterance any proposition, the nerve arrangements so set up remain 'organised' for a time as a distinct and independent total ; or, in other words, that the group of nerve modifications which arises on the formation of each of our propositions, persists for at least some short time, as a fixed and strongly marked state. Thus, in the case of an unfortunate catalogue compiler, whose brain broke down into a state of aphasia the moment his work was done, the utterance that was on his tongue repeated itself constantly when he had lost all other speech, and he kept on saying '*List complete*,' because that group of nerve modification was just formed, and was still persistent when the stoppage came ; and, thereby, what would have been only a temporary prominence became fossilised."*

In further illustration of the above remarks, the following case may be cited :—A British captain, at the battle

* Journal of Mental Science, April, 1880, p. 21, being a review of Hughlings Jackson's theories.

of the Nile, was in the act of giving an order from the quarter deck of his vessel, when a shot struck him on the head, depriving him immediately of speech. As he survived the injury, he was taken home and remained deprived of sense and speech in Greenwich Hospital for fifteen months. At the end of that period, during which he is said to have manifested no signs of intelligence, an operation was performed on the head, which almost instantaneously restored him to consciousness. He then immediately rose from his bed, and not recognising where he was, or what had occurred, expressed a desire to complete the order which had been so abruptly interrupted when he received his injury during the battle fifteen months before.*

As an instance of this '*fossilisation*' of impressions, a modern French philosopher, Paul Janet, mentions the case of an old priest who was incapable of pronouncing distinctly two words having any sense—'*c'était à peine un bégayement*;' if, however, an appeal was made to his verbal memory, he could recite the fable of *La Fontaine*, '*Le Coche et la Mouche*,' or the celebrated exordium of Father Bridaine, and this he would do with the most perfect distinctness of articulation, although he was evidently incapable of understanding a single word of what he said. In this case, says Paul Janet, the mnemonic mechanism had remained sound at a particular point, which only required stimulation to make it act.†

* Winslow, op. cit., p. 462.

† *Le Cerveau et la Pensée* par Paul Janet, Membre de l'Institut, p. 140. This highly philosophical treatise contains much original matter, and is well worthy of a careful perusal by all medical psychologists who are endeavouring to trace the connection between thought and speech.

7.—The loss of speech may be the sole morbid symptom, or it may be accompanied by some paralytic symptom.

It has been asserted that aphasia without paralysis is uncommon. In a contribution to the *Medical Times* of January 18th, 1868, Dr. Wilks says:—"When paralysis exists, we believe that some portion of the motor tract must be affected, and that this need not arise from a local lesion of the cortical substance; consequently it might be thought possible for hemiplegia to occur without loss of speech and *vice versa*, but I cannot find this is the case."

It is with great diffidence that I venture to criticise the opinion of so eminent an authority as Dr. Wilks; but the above statement is so utterly at variance with my own experience, that I cannot allow it to pass unnoticed.*

I could cite numerous cases confirming what I myself have noticed, that the loss of the power of expressing ideas in articulate language is often the only evidence of brain disorder, and amongst the numerous observations recorded in these pages, it will be observed that in a large number the impairment of speech was the only sign of diseased action (*vide* Andral, Broca, and Dr. S. Jackson, of America).

One of the most remarkable instances of this variety was that recorded by Trousseau when speaking of the aphasia of his colleague, Professor Rostan. This case is

* Since the publication of my first edition, I find Dr. Wilks has modified his views, for in his valuable work on "Diseases of the Nervous System," he has an article on "Simple Aphasia," and he even records a typical case, which may be added to the numerous instances I have quoted of uncomplicated aphasia."

of such value, from the fact that the subject of it had devoted a long life to the investigation of cerebral disease, and consequently was so well qualified to appreciate, and accurately to describe the symptoms he experienced in his own person, that I shall transcribe it here :—

“Dr. Rostan, being confined to his house from the effects of an accident, had been reading nearly all day, and had thus fatigued his brain. He was engaged in reading one of Lamartine’s literary conversations, when, all on a sudden, he perceived that he imperfectly understood what he was perusing. He stopped a moment, then resumed his reading, but again experienced the same phenomenon. In his alarm, he wished to call for assistance, when, to his great astonishment, he found himself unable to speak a word. He now fancied himself the subject of apoplexy, and he immediately caused his arms and legs to execute various complex movements, and found there was no paralysis. Being alone, he rang the bell, and when his servant came, he could not speak a word. He moved his tongue in all directions, and was struck with the strange contrast which existed between the facility of movement of the vocal organs, and the impossibility of giving expression to his thoughts by speech. He now made a sign that he wished to write; but when pen and ink were brought—although he had the perfect use of his hand—he found himself quite as unable to give expression to his thoughts by writing as by speaking. On the arrival of a physician, at the end of two or three hours, Dr. Rostan turned up his sleeve, pointed to the bend of the elbow, and clearly indicated that he wished to be bled. Venesection was hardly finished, when a few words could be uttered; by

degrees the veil seemed to be removed, and at the end of twelve hours speech was entirely restored, or, to use Professor Trousseau's emphatic language, "*tout était rentré dans l'ordre.*"*

A striking example of aphasia without paralysis was published by M. Ange Duval in the "*Bulletin de la Société de Chirurgie*" for 1864; the subject of it being a lad five years of age, who fell from a window upon his forehead; the result of the fall being a fracture of the frontal bone on the left side. The intelligence of this child continued unaffected, and there was no paralysis, but he never uttered another articulate sound. This boy was accidentally drowned thirteen months after his fall, when an examination of the encephalon disclosed a cyst, of the size of a walnut, which was full of serum, and was evidently the result of a former contusion of the left frontal lobe; this cyst was situated principally in the *third left frontal convolution*.†

In his chapter on partial cerebral anæmia, Hammond, in protesting against the too absolute assertion of Erlendmeyer, that in cerebral embolism, the facial, hypoglossal, and the nerves of the extremities are always more or less affected, mentions the case of a lady, who, after repeated attacks of acute rheumatism with marked aortic insufficiency, was seized with headache and vertigo whilst

* "*Clinique Médicale*, tom. ij., p. 573.

† The details of this case are given at great length by M. de Font-Réaulx in his thesis for the Doctorate at the Faculty of Medicine of Paris, 1866. It seems that the localisation of the faculty of speech has been a subject frequently selected of late for a thesis by graduates of the Paris Faculty. Among the most remarkable, I would mention those of M. de Font-Réaulx and of M. Carrier, both of which have furnished me with interesting matter.

conversing with a friend, and her speech was cut short with as much suddenness as though she had been shot. There was no paralysis of the tongue, but all idea of language was abolished; within forty-eight hours she recovered entirely the faculty of speech.*

Hughlings Jackson says that sudden and temporary loss of speech occurs with or without one-sided paralytic symptoms in patients who are liable to have convulsive seizures called epileptiform.

Huguenin, in speaking of traumatic meningitis and contusio cerebri, mentions the case of a fall on the head, in which aphasia, without any other form of paralysis, persisted for fourteen days.†

Nothnagel, when treating of the occlusion of the cerebral vessels, remarks that cases have occasionally been met with, where no other diagnosis but that of embolism could be entertained, in which the patients were suddenly attacked, entirely without warning, by aphasia, unattended by other symptoms of any kind; the loss of speech disappearing in the course of one or two days.‡

Not only does pure uncomplicated aphasia occur, but when loss of speech coincides with hemiplegia, the aphasia may persist after the disappearance of the paralysis. An instance of this was mentioned at the Anatomical Society of Paris by M. Pelvet, who, in exhibiting the brain of a man, aged 56, stated that he awoke one morning paralysed on the right side of the body, and deprived of the power of speech; the paralysis lasted only two days, but the aphasia persisted.

* Diseases of the Nervous System, p. 129.

† Ziemssens Cyclopædia, vol. xii. 673.

‡ Ibid, vol. xii., 197.

My own observation and researches do not lead me to endorse the opinion that aphasia without paralysis is uncommon ; in fact, I have recorded several instances of it in these pages, amongst which I would especially refer to the cases of Dr. Gairdner and of Dr. S. Jackson, at pages 73 and 83, and to these I will add one more that fell under my own personal observation :—

Thomas Sago, a wherryman, aged 23, was admitted into the Norfolk and Norwich Hospital, under my care, on April 1st, 1878, at 5 p.m.

An hour previously, whilst engaged in washing his wherry, he was suddenly seized with aphasia and facial convulsions. He walked into the waiting room, but was totally unable to speak a word ; he was quite sensible and intelligent, and able to move his arms and legs well, when asked to do so. His face was pale ; constant twitchings of the right side of the face, and snapping of both eyelids ; pupils somewhat dilated, conjunctivæ insensible ; jaws generally close and firmly shut, but the teeth chattered occasionally ; the pulse was slightly quickened, and the breathing somewhat rapid and laboured.

The facial convulsions lasted for half an hour, when they subsided, and the patient had a warm bath ; at 6.45 he had a severe epileptiform seizure lasting only four minutes, and two others within an hour. It was not till 10 p.m., a period of six hours, that he began to speak a few words, the speech continuing gradually to improve.

Two days after admission, there was again complete aphasia, lasting this time half an hour, preceded by facial twitchings. On several other occasions he lost his speech for three or four minutes, but there never was any motor paralysis of any kind whatever.

The House-Surgeon, Mr. C. Firth, to whom I am indebted for having carefully noted the details of this case, made an ophthalmoscopic examination, but with almost negative results ; that is, the fundus was redder than usual, veins of the retina large, discs small and pink ; sight good. He had never been taught to write, but could read as well as ever.

It is impossible to meet with a case more to the point than this, but possibly some may say that there might have been some motor paralysis, very slight, and so evanescent in character as to escape observation. This explanation might apply when the clinical history is mainly obtained from the patient himself or his friends, but here is a case watched in a public hospital with a special view to the elucidation of the point in dispute. There was cerebral irritation, as shown by convulsive action, but never the smallest trace of motor paralysis.

The occurrence of uncomplicated aphasia seems to me such a well ascertained fact, that I should not have dwelt upon this point at such length, were it not that it has an important bearing upon the question of cerebral localisation; moreover, the existence of aphasia without paralysis may receive some elucidation from a consideration of the chemical, molecular, and thermometrical changes that may arise in the cerebral tissue, a subject that I propose to resume in a subsequent chapter.

8.—In another variety there is a remarkable perversion of speech; patients can articulate, but there is no connection between the articulated sounds and the ideas which they may wish to convey; the relation between the ideas and the word-pictures becomes so disordered, that, instead of appropriate terms, words having a totally different meaning, or altogether strange and unintelligible expressions, are enunciated; moreover, the subjects of this peculiar disturbance of speech do not seem to be aware of the defect, and their faces wear an expression of astonishment at not being understood. To this form, the term *Heterophasia* or *Paraphasia* has been applied.

In illustration of this variety, Dr. Osborne has related

the history of a gentleman, who, after recovery from an attack of apoplexy, had the mortification of finding himself deprived of speech; or rather he spoke, but what he uttered was quite unintelligible, and his extraordinary jargon led to his being treated as a foreigner in the hotel at Dublin, where he stopped.

In order to ascertain and place on record the peculiar imperfection of language which he exhibited, Dr. Osborne selected the following sentence from the by-laws of the College of Physicians, viz:—" *It shall be in the power of the College to examine or not to examine any Licentiate, previous to his admission to a Fellowship, as they shall think fit.*" Having requested him to read this aloud, he read as follows:—" *An the be what in the temother of the trothotodoo to majorum or that emidrate ein einkrastrai mestreit to ketra totombreidei to ra fromtreido asthat kekritest.*"

A few days afterwards the same passage was presented to him, and he then read it as follows:—" *Be mather be in the kondreit of the compestret to samtreis amtreit emtreido am temtreido mestreitereso to his eftreido tum bried rederiso of deid daf drit des trest.*"

Dr. Osborne calls attention to the fact, that although the patient appeared generally to know when he spoke wrong, yet he was unable to speak right, notwithstanding, as is proved from the above specimen, he articulated very difficult and unusual syllables, and was completely free from any paralytic affection of the vocal organs.* One very remarkable feature in this case was that his utterances were not in accordance with his mental impressions, for Dr. Osborne clearly ascertained that

* Osborne, op. citato, p. 160.

although he employed strange words having no connection whatever with the printed text before him, he really understood the sense of what he was purporting to read. In fact, he continued to read a newspaper every day, and when questioned, it was proved that he had a very clear recollection of all that he read.

Dr. W. A. Browne has recorded a characteristic exemplification of the above in the following passage, taken down from the lips of a female patient in the West Riding Asylum:—"Kallulios, tallulios, Kaskos, tellulios, Karoka, Keka, tarrorei, Kareka, sallulios." This patient would jargonise in this way uninterruptedly for hours together, all the sounds being similar in character to those of the above specimen, and having a vague resemblance to Greek. When spoken to or asked a question, she always replied in the above manner, and seemed surprised that the person whom she addressed did not understand her.*

Trousseau has recorded the case of a lady, who, without having ever experienced any paralytic symptom, was affected with the following strange perversion of speech.† On receiving a call from a visitor, she rose to receive him with a benevolent smile on her countenance, and pointing to a chair, said—"Pig, Brute, Stupid Fool." "Mrs. B—— begs you to be seated," said a relative who was present, and who thus became the interpreter

* West Riding Medical Reports, Vol. ii. It will be observed that in the above case, as well as in that recorded by Dr. Osborne, the syllabic construction of the words used was perfect, and the flow of speech smooth and continuous; the sentences themselves, however, being a combination of meaningless words, quite unintelligible to the hearers, and in no way, probably, representing the thoughts of the speaker.

† Clinique Médicale, tom, ij., p. 576.

of the wishes of the patient thus strangely expressed. Trousseau adds that the acts of this lady seemed logical and sensible, and, strange to say, she did not seem to be aware of the foul language she was using.*

Dr. W. T. Moore, of Dublin, has also published a similar case of a gentleman, aged fifty-six, who, after an attack of hemiplegia, completely lost the connection between ideas and words. On one occasion Dr. Moore was much puzzled by the patient saying to him—"Clean my boots." Finding that he was not understood, he

* In a lengthened notice of my first edition in the *Spectator*, the writer of the article, after dwelling especially upon the cases reported under the head of Heterophasia, asks "How is it to be explained that without any loss of intelligence, the great 'instrument of thought,' as language has been called, should so completely defy the power which produced it and defined its exact sphere of duty?"

Then he proceeds to institute a comparison between these strange perversions of speech and the kinesis disturbances observed in chorea. "As regards the mere incapacity for rightly directing the muscles so as to articulate the proper sounds, while the clear power to recognise the right sounds as articulated by others, remains—the commonest form of aphasia—we do not know that there is anything more remarkable than in that incapacity to restrain the muscles of the arm to their proper functions which is so frequently exhibited by sufferers from St. Vitus's dance. A man, who, on meeting you in the street, suddenly points up to the clock of St. Paul's instead of shaking hands, is really in precisely the same position as the lady who said, 'Pig, brute, stupid fool,' instead of 'I am glad to see you,'—supposing, that is, that the latter clearly recognised her own mis-direction of oral energy. The failure was solely in the proper nervous control over certain muscles, and though the effect is much stranger and more grotesque to us in relation to language than in relation to muscular movements of the arm, there is no real difference. A man partially paralysed attempting to move, will often do the very opposite thing to what he attempted, but that does not in any degree affect the condition of his mind, only the control of the mind over his body. And so also it is, when the wrong words come out of the mouth, and are recognised by the speaker to be the wrong words." *The Spectator*, June 3, 1871, p. 667.

became much excited, and cried out vehemently—*"Clean my boots by walking on them!"* At length it was ascertained that the cause of his disquietude was the shining of the candle on his face, and that the object of his unintelligible sentences was to have the curtain drawn ; when this was done he appeared quite gratified. This patient slowly improved from this attack, but became a lunatic, in which state he survived for fifteen or sixteen years. In commenting on this singular case, Dr. Moore calls attention to the fact that, although there was no connection whatever between the words used and the ideas intended to be conveyed, this patient formed complete sentences : the power of co-ordination and of articulation was perfect, and the intelligence was, to all appearance, unimpaired.

In a discussion on Emotional Aphasia, at Edinburgh, Dr. Gairdner, said he remembered a case personal to himself. When going through the wards of the Glasgow Infirmary, after a deal of hard professional work, he lost command of his tongue, and found himself talking nonsense—absolute nonsense ; he knew it was nonsense, yet he could not help it, and he felt for the time being, that he must speak nonsense. At the same time he was attacked with dizziness, but after resting a little, he regained the control of himself, and the symptom never occurred again. This attack Dr. Gairdner could only attribute to the extreme fatigue he at that time experienced. Dr. Gairdner mentioned also the case of a Scotch sheriff, who, at one period of his life, felt occasionally that he must speak nonsense—absolute nonsense ; later in life this tendency left him entirely.

In speaking of the above form of speech disturbance, Kussmaul says that "there is an inability properly to

connect the word-images (die Wortbilder) with their corresponding conceptions (Vorstellungen), so that instead of those corresponding to the sense, misplaced or entirely incomprehensible word-images present themselves." He also adds that "there is a form of paraphasia which does not overstep *physiological limits*, and that persons in good health frequently make mistakes in speaking, of which they may or may not be conscious. These mistakes are due to *absence of mind*. The same cause—want of attention—which may develop into a state of *intellectual confusion*, is also usually the starting-point of *pathological* paraphasia. At all events, it is certain that by means of attention, we exercise an influence over the motor and sensory central apparatus of language, which is indispensable for correctness of speech. When the attention flags, inappropriate words are often used; and the defects in accentuation, in intonation, and in literal and syllabic enunciation, may be such as to render the speaker quite unintelligible."*

Dr. Wibe, of Lede, has recorded a case in which the speech disorder assumed the form of verbal delirium, as a result of a traumatic lesion:—A man, aged 26, received a blow in the left temporal region, just above the ear, causing a fracture with depression. The bone was elevated, and the febrile symptoms previously existing subsided, but disturbance of speech was observed, the peculiarity of which consisted in his inability to control his language; and whilst at church in the middle of his prayers, he began to swear in spite of himself, being quite unable to restrain his oaths.†

* Die Störungen der Sprache, s. 155, 187.

† Bulletin de la Société de Médecine Mentale de Belgique, 1884, No. 33, p. 24.

It has long been a vexed question whether it be possible to reason mentally without having the words in the mind which represent the subject of our reasoning ; whether, according to Condillac, intelligent thought is bound up with words, or whether it is quite independent of them, as maintained by Locke, Maudsley, and others. A careful consideration of the above cases of perversion of speech would seem to justify the conclusion that conceptions may originate without words, and that thought, and clear thought is possible without its corresponding word-images.

9.—The defect may be limited to the loss of articulate language only, or may extend to written language, and also to the language of signs. One of these faculties may be destroyed whilst the others remain intact.

Writing, next to speech, is the most important channel for the manifestation of the operations of the mind, and yet it is only quite recently that the diagnostic value of its morbid alterations has been recognised. M. Charcot defines *Agraphia* as *Aphasia of the hand*. *Agraphia* is for writing, what *aphasia* is for articulate language—that is, it is not a *material* but a *psychical* inability to write ; they are both functional troubles of the same nature, but the result of different morbid conditions ; most authorities placing the lesion in motor aphasia in the posterior part of the third left frontal convolution, whilst motor *agraphia* is attributed to lesion of the posterior part of the second left frontal convolution—the supposed centre for writing.

In an interesting essay, entitled “*Die Schrift*,” Dr. Erlenmeyer has pointed out that the mind, as well as the hand, contributes to the production of written language ; the disturbances of this faculty are, therefore,

psychical as well as mechanical. The mechanical troubles affect only the composition of the writing itself—that is its form; the psychical troubles, on the contrary, affect the nature of the contents of the writing—that is, the grammar and the style.*

It would seem that loss of speech more commonly coincides with loss of the power of writing; this, however, is by no means invariably the case, and Dr. Wm. Ogle has recorded a case of dextral paralysis in which the speech was limited to the two words “yes” and “no,” but the power of writing, with the left hand, remained in its integrity. Trousseau records a similar case of a man, who, in coming to consult him, informed him by signs of his inability to speak, but gave him a note, written in a firm hand by himself, in which was contained a detailed account of his disorder; from this note M. Trousseau learned that some days previously he had suddenly lost consciousness, on recovery from which there was no symptom of paralysis, but he found himself unable to articulate a single word.†

Dr. Ogle considers that the occasional separation of agraphia and aphasia is an argument in favour of the existence of distinct cerebral centres for the faculties concerned in speaking and writing; while the more frequent coincidence of the two would lead him to infer that these distinct centres must be closely contiguous.‡

* Bulletin de la Société de Médecine Mentale de Belgique.

† “Clinique Médicale,” tom. j., p. 615.

‡ St. George’s Hosp. Rep., Vol. 2, 1867, p. 100. The word agraphia was introduced by Dr. Wm. Ogle; it is, however, a new revival of an old Greek word mentioned in Stephen’s Thesaurus. Bernard says this is the third example of a very extraordinary resurrection of words, such as Horace scarcely foresaw (*Multa renascentur, quæ jam cecidere*). A Greek,

Winslow and Marcé have mentioned instances where the faculty of writing was lost, whilst that of articulate speech was preserved, showing that, whilst the memory of words is retained, the patient, although not affected with any paralysis of the hand, may still be unable to write. The power both of speaking and writing spontaneously may be suspended, and yet the faculty of imitation may be so well developed that words can be repeated, and even written without difficulty, when they are pronounced by another person.* Patients who have entirely lost the power of giving expression to their thoughts in writing, may still be able to write from dictation, or can copy from a printed or written page; others can trace correctly geometrical figures.

The following case has recently been published by M. Pitres, and presents so many features of interest in reference to *agraphia*, that I add a condensed account of it. As the patient had neither word-blindness nor word-deafness, it furnishes a typical example of the uncomplicated form of the disorder I am now considering.

M. Leopold L——, a wine merchant, at the age of 21, contracted syphilis, and subsequently led a most irregular life. At the age of 31, he was suddenly seized with right hemiplegia and aphasia.

Chrysaphis; a Frenchman, Broca; and an Englishman, Ogle, employed essentially Greek words, under the impression that they were inventing new terms.

* Sir Thomas Watson has kindly communicated to me the particulars of a case of dextral paralysis, with not only loss of the power of speaking and writing, but the patient had forgotten her letters, and could not pick out an s or an n in a child's alphabet. This I believe to be an unusual condition, for in most cases the symbol representing a word is recognised when put before the patient; that is when, as in Sir T. Watson's case, the intelligence is unaffected.

Under a vigorous anti-syphilitic treatment, he recovered his speech in eight days; the motor power, however, was regained more slowly, but at the end of eighteen months, the paralysis had entirely disappeared, with the exception of slightly diminished motor power in the right hand, the dynamometric pressure of which was 34 kilogrammes as compared with 34 kilogrammes for the left; the hand-grasp thus being equal on both sides. The right leg, however, was the seat of slight permanent rigidity. The following very interesting functional troubles were then observed:—The intellect was unaffected, and articulate speech was perfect, there being no impediment in the articulation of words. The patient could read aloud, and with the same facility both written and printed matter, and perfectly understood the purport of what he was reading. When interrogated in reference to his symptoms, he replied that he experienced nothing abnormal but a little stiffness in the right lower limb, and *an absolute impossibility to write with the right hand*, although he could move the hand easily in all directions, and was able to use it for dressing himself, for eating, and for every other purpose except writing, which he had learnt to do very creditably with the left hand. His hearing, taste, and smelling were normal; but optometric examination disclosed a very decided right-sided hemianopsia.

In order to test his powers of writing, he was placed before a table, and being furnished with paper and a pencil, was requested to write with the right hand the word "Bordeaux." He took the pencil in his hand, holding it in the proper position apparently without any difficulty, but he was totally unable to write a single letter. He perfectly understood mentally the letters which he must trace in order to write the word, and he spelt the letters which entered into its composition B, o, r, &c.; he pointed out these letters in a newspaper, but he was unable to write them. "I know very well," he said, "how the word Bordeaux is written, but when I wish to write with my right hand, I can do nothing." With the left hand, he wrote very legibly and correctly, "Bordeaux;" then taking the pencil in his right hand, and looking repeatedly at each letter which he had just written, he succeeded in reproducing it with the right hand; he could copy that which he could not write.

He was then asked if he recognised the shape of single letters,

the letter L, for instance ; he replied in the affirmative, and in order to prove it, he looked for this letter, and pointed it out as occurring in several printed or written words. On being requested to write this letter with the right hand, he was only able to make incoherent scrawls, in nowise resembling the general shape of the letter L. He could, however, write this letter very well with the left hand, and when he had it under his eyes, he could recopy it roughly with the right hand. The result was the same with other letters, p, c, x, &c.

The same series of phenomena was observed for figures. He could read out figures without any hesitation, and could even make a mental calculation, and if several numbers were placed one below another, he could add them up without a mistake, but he was unable to write down the total with his right hand. On being asked to write down the number 125, he could only succeed in doing it, after having previously written it with his left hand, although he knew the number was composed of the figures 1, 2, and 5.

If instead of asking him to write a word, a letter, or a figure, he was requested to draw a geometrical figure—a circle, a triangle, or an octagon, he did it instantly with the right hand ; he was also able to sketch with the right hand the profile of a human form, in proper proportions.*

On summarising the above clinical history, it will be seen to be a case of aphasia, as the result of syphilitic disease of the brain, with rapid recovery of the power of articulate speech, but with persistent agraphia, characterised by the capacity of copying written and printed matter ; moreover, the patient copied not only the models that were placed before him, but he could copy with his right hand what he himself had written with his left, although he was totally unable spontaneously to trace a single letter with the right hand. It will be observed, however, that the inability to write with the right hand

* A. Pitres.—*Considérations sur l'agraphie* (*Revue de Médecine*, 1884, tome iv., p. 855).

did not depend upon any common paralysis of the muscles of the hand or of the fore-arm, for the patient was able to trace on paper geometrical figures, and even to draw the outline of the human form; what was wanting was the memory of the different movements necessary for tracing written characters; the fault, therefore, was not in the right hand itself, but in the orders sent down to it from the brain, or as Dr. Bastian would say, the defect was in the cheiro-kinæsthetic centre.

There is a form of writing which has been described by Buchwald under the name of *Spiegel-Schrift*, or *Mirror-writing*, in which those affected with this peculiarity write from right to left—the normal position of the letters being reversed.*

Bernard mentions a curious case of a laundress who was the subject of progressive locomotor ataxia, and who from partial paralysis was unable to write with the right hand, but wrote in mirror-writing with the left. She was able to read what she had written, but was not aware that it differed from ordinary writing; she could not understand why she received no replies to her letters, which of course no one could read, and she attributed the silence of her correspondents to other motives. The same writer reminds us that the first seven letters of the Greek chieftain Agamemnon are in Mirror-writing, in the Hall of Phidias at the Louvre, the last two letters

* Berliner klinische Wochenschrift, 1878. In this communication, the author reports three cases illustrative of reversed writing in brain disease, and in all of them, there was right hemiplegia and aphasia. On looking over the records of his Klinik, Buchwald found that no tendency to mirror-writing had existed in cases where the paralysis and aphasia had been of slight degree, nor when they had been of short duration.

however, being turned round from left to right ;* the word would, therefore, seem to be written after an ancient mode, which is observed in the Sigeian Inscriptions on the Arundel marbles. This mode of writing was characterised by the term *Βουστροφηδόν*.†

10.—In reference to the language of signs and of pantomimic expression, it is more commonly unaffected, and some authors have even defined aphasia as the loss of artificial language, with the preservation of natural

* Bernard, "De l'aphasie et de ses diverses formes," pp. 235, 237.

† In a chapter on the Diversities of Language, Mr. Welsford gives the following interesting details in reference to this mode of writing :—The great family of the Shemitic or Arabic class of languages, the Hebrew, the Chaldee, the Syriac, the Samaritan, and of course the Arabic itself, have from time to time immemorial been written from right to left ; while, on the other hand, the Sanskrit or Indian class of languages, comprehending the Sarmatian or great Slavonic family, together with all the languages of modern Europe, are now written from left to right. But this was not always the case, for a few of the oldest Greek inscriptions, denominated *Βουστροφηδόν*, from their supposed resemblance to the action of an ox ploughing, are written in lines running from left to right, and from right to left alternately. This mode of writing may be regarded as a connecting link between the two great families of languages, of which the Arabic and the Sanskrit may be regarded as the keys ; but there are grounds for suspecting that, at a still earlier period, the Greeks wrote entirely from right to left like the Phœnicians, as by far the larger part of the inscriptions denominated Etruscan, but which are really little more than the remains of the Greeks settled in Italy, are written in the same manner.—Mithridates Minor, or an Essay on Language, p. 27.

In a personal communication with which I have been favoured from the Rev. E. S. Roberts, of Caius College, Cambridge, the accomplished author of "Greek Epigraphy," Mr. Roberts remarks that instances of *Βουστροφηδόν* writing in Greek inscriptions may now be described as very numerous rather than few. Moreover, the numerous ancient Greek inscriptions from Crete show conclusively that the Greeks, for some time after the derivation of their alphabet from the Phœnicians, wrote only from right to left.

language. Ballet disputes this statement, remarking that in certain cases natural language is disturbed to the same extent as the artificial. Mimicry, says he, forms although perhaps a very elementary, still a real form of language, which, like other forms, has its pathological disturbances—amimia.*

In most of the recorded cases the power of communication by signs is not mentioned at all. Lelong, the subject of one of Broca's celebrated cases, could make himself entirely understood by his expressive mimic; I have recorded the same fact in the history of my patient Sainty. The eminent surgeon, Sir William Lawrence, was the subject of hemiplegia with aphasia, and Sir Thomas Watson, who attended him, thought it desirable to give the patient some sedative. Lawrence knowing this, and wishing to indicate what remedy he desired, was unable to find the word he wanted, and became greatly agitated in consequence. Sir Thomas Watson got pen, paper, and ink, and asked him to write the word. This he could not do, but taking the pen full of ink, made a large splash on the paper, and offered it to those at his side. Sir Thomas Watson at once perceived the drift of this, and saw that his patient wished for the "black drop," a discovery which greatly delighted and satisfied Lawrence.

Sometimes, pantomimic language, without being abolished, is wanting in precision or is perverted, as was observed by Dr. Perroud, of Lyons, whose patient would make a sign of affirmation when she meant the contrary.† I have lately seen a similar case with my friend

* G. Ballet. "Le Langage Intérieur," pp. 3, 73. Paris, 1886.

† De Font-Réaulx, op. cit., p. 57.

Mr. Morgan, in which the signs for assent and dissent were reversed. To this particular form of disturbance of expression by gesture, Kussmaul has given the name of Paramimia.

Sometimes the faculty of imitation is exaggerated to an extraordinary degree, when the phenomenon is produced which Romberg calls the "echo sign." During a recent visit to La Salpêtrière, Dr. Auguste Voisin kindly called my attention to a remarkable instance of this form then in one of the wards. The subject of it was a woman, aged 56, who had right hemiplegia with aphasia, and who, although she never spoke, repeated all that was said—for instance, Dr. Voisin addresssd her thus, "Voulez vous manger?" She said, instantly, "Voulez vous manger?" I then said to her, "Quel age avez vous?" She replied, "Quel age avez vous?" I then said to her in English, "You are a bad woman." She instantly said, "You are a bad woman." I said, "Sprechen sie Deutsch?" She retorted, "Sprechen sie Deutsch?" In the words that she thus echoed, her articulation was distinct, although the foreign phrases were not repeated by her in quite so intelligible a manner as the French. Not only did this woman echo all that was said, but she imitated every gesture of those around her. One of the pupils made a grimace; she instantly distorted her facial lineaments in precisely the same manner; another pupil made the peculiar defiant action, common in schoolboys, of putting the thumb to the nose, and extending all the fingers—called in French, *pied de nez*. The patient instantly imitated this elegant performance. Just as we were leaving her bedside, a patient in an adjoining bed coughed; the cough was instantly imitated by this human parrot! In fact, this singular

old woman repeated everything that was said to her, whether in an interrogative form or not ; and she imitated every act that was done before her, and that with the most extraordinary exactitude and precision.*

A few years ago, I saw, with Dr. McKelvie of Cromer, a lady in whom the "echo sign" existed, not in connection with articulate speech, but with written language, for when spoken to, she *echoed in writing* the words addressed to her.

The subject of this peculiarity, Mrs. M., a distinguished authoress, aged 72, a month previous to my visit, had an attack of convulsions, which left her quite speechless, but without any motor paralysis, the faculty of written language remaining unimpaired. After a few days, it was observed that, instead of answering questions, she would repeat them in writing. Thus, on being asked, "Had you any sleep last night?" she took her pencil and retorted, "Had you any sleep last night?" She was then remonstrated with thus, "Oh no, answer our question:" she replied in writing, "Oh no, answer our question."

It will be observed that in the above instance, the impression made upon the auditory centre, stimulated the centre for written language, and, as far as I know, this is

* In a French translation of my researches on Aphasia, which appeared in several numbers of the "Gazette Hebdomadaire de Médecine" during the years 1869 and 1870, the translator, M. Villard, gives some further details about this patient, whose subsequent history he had the opportunity of studying. He states that about five years after my own visit to her, she became absolutely mute, and no longer echoed that which was said in her presence ; she also ceased from imitating by gesture the acts of others, and seemed to have merged into a state of indifference to all that was passing around her.

the only case on record in which imitative language took the graphic instead of the phonetic form.

Kussmaul characterises this impulse of imitation as an *acoustic reflex*, and says that the stimulus to the motor-centre of sound originates in such cases in the acoustic centre, which receives the words as an orderly succession of sounds, and transfers them to the former.*

Dr. Winslow, under the head of *Morbid Imitation Movements of Articulation*, remarks that he has often observed this echo sign at the commencement of acute attacks of disease of the brain, particularly of inflammatory softening; this condition was observed after death in a case reported by Romberg.†

When all other forms of language are either suspended or perverted, there may still remain one, which is the same in all countries and among all people—the language of physiognomy: the aphasic may still evince pleasurable sensations by a smile, give evidence of shame by the blush on the forehead, and of fear by pallor of the countenance.‡

* Die Störungen der Sprache, s. 55.

† “Diseases of the Nervous System,” Sir E. Sieveking’s Translation, Vol. ii., p. 431.

‡ The language of physiognomy has not been sufficiently considered by writers on the localisation of the cerebral faculties. This subject is fully developed by M. Albert Lemoine in his philosophical treatise entitled *La Physionomie et la Parole*, Paris, 1865.

CHAPTER VII.

Varieties continued. Sensory Aphasia. Hearing and the cerebral operations that follow impressions on the ear. Word-deafness—a purely psychical and not an auditory defect; may be confounded with insanity. The perception of musical sounds may be abolished as well as that of articulate language—Grant Allen on Note-deafness. Verbal amnesia. Word-blindness—The psychology of Sight; cortical blindness, psychical blindness, and word-blindness. Pathology of Word-deafness and Word-blindness — Experiments on animals by Ferrier, Schäfer, and Sanger Brown; their conflicting results. Hemianopsia. Intermittent Aphasia. Hysterical Mutism.

Sensory Aphasia.—Within the last few years, forms of sensory aphasia have been described by Wernicke,* to which Kussmaul subsequently gave the names of Word-deafness and Word-blindness (Worttaubheit, Wortblindheit). Although the writings of the above-named authors have brought these morbid conditions into more prominent relief, Dr. Bastian had previously fully recognised the sensory nature of such defects; and although he had not endowed them with any special name, these peculiar psychical disturbances, as well as the important part played by commissural fibres between the visual and auditory centres, were fully described by him.†

* G. Wernicke. "Der Aphasische Symptomencomplex." Breslau, 1874.

† "On the Various Forms of Loss of Speech in Cerebral Disease."—*British and Foreign Medico-Chirurgical Review*, April, 1869, p. 482, &c.

These peculiar forms of cerebral disturbance may be considered as types of amnesic defect, in which that part of the apperceptive faculty of speech in relation to the senses of hearing and of vision is disordered. It is essentially the impressive or centripetal function that is impaired; the expressive or centrifugal function may remain totally unaffected; the patients have not lost the power of speaking or of writing, but, although the hearing is perfect, they are no longer able to understand the words which they hear; and although vision is perfect, they are unable to read and understand the written or printed words which they see. In both of these forms, it is the passive phase of the faculty of language that is affected.*

* Whilst this chapter is passing through the press, my attention has been called to an extremely interesting lecture on Sensory Aphasia, by Dr. A. Hughes Bennett, in which he says that "it is through the senses, and especially through those of hearing and sight, that the faculty of intellectual language is acquired, and by which it is organised in the individual. The association of the senses with the acquisition of speech is effected by certain nervous elements, including the organs of sense, various conducting media, and centres in the medulla and cortex cerebri. By sensory aphasia, therefore, is understood the results of interruption or disease of any of these centripetal paths or centres which induce an imperfect appreciation of language or its symbols, and which, as a consequence, may indirectly lead to disorder of the faculty of expression. In addition to the sensory organs themselves, and the complex nervous arrangements which connect them with the surface of the brain, there must be other and more extensive cerebral structures engaged in the acquisition or formation of speech. These supply what has been termed the apperceptive faculties, or the mental attributes involved in the process of human intercourse or communication, the exact nature and locality of which is not accurately determined. Therefore, on the sensory side, aphasia may arise either from disease of the centres associated with the senses themselves, and especially those of hearing and sight, or with a derangement of the nerve elements, whatever and wherever they may be, which preside over the so-called apperceptive

Although so much has lately been written about Sensorial Aphasia, such conflicting opinions have been enunciated by various authors, and the subject is still involved in so much obscurity, that, before describing the clinical symptoms of Word-deafness, I propose to make a brief allusion to the philosophical treatise of M. Ballet, which I think is calculated to elucidate this obscure branch of cerebral pathology.

In an interesting chapter on the partial or total effacement of the auditive images of words, Ballet remarks that the cerebral operations that follow impressions on the ear are of three kinds. 1. The physical perception of sound, which makes us conscious of it, and permits us to appreciate in it certain general characters—it is hearing properly so called. 2. The perception of sound in the form of an image susceptible of reviving the idea of a given object—it is the hearing of objects and things. 3. The perception of a word, not only as a sound or as a collection of sounds, but as a differentiated sound capable of arousing the idea which it represents—it is the hearing of words, or verbal hearing.

An example will enable us to recognise the fundamental differences between these three categories of operations:—When a bell resounds in our ear, firstly, we distinguish the sound which it produces, we perceive vibration of which we were not conscious before the bell rang—this is audition properly called; secondly, from the habit of hearing the bell, we recognise the sound as

faculty. This results in what has been termed respectively word-deafness, word-blindness, and word-forgetfulness, or verbal amnesia, each being due to disorder of the special nervous mechanism which originates and regulates the corresponding function.”—“Clinical Lectures on Diseases of the Nervous System,” *British Medical Journal*, Feb. 18th, 1888.

that produced by a special object, a bell—here is audition of objects; thirdly, this same idea of a bell may be aroused in our mind by a sound which is no longer that of a bell, but that of a *conventional* word, which, by education, we are accustomed to associate with the idea of the object—this is verbal audition. Each of these three forms of audition may be deranged separately, and it is convenient, with Munk, to designate the complete abolition of audition by the term cortical deafness (Rindentaubheit); the abolition of the audition of objects by the term of psychical deafness (Seelentaubheit); and the loss of verbal audition by the term word-deafness (Worttaubheit).

Thus a person affected with word-deafness will hear the sounds, will be able to connect them with the object which produces them, but will not understand the sense of the words spoken.

A person struck with psychical deafness will hear the sounds, but will be incapable of understanding the signification of these sounds, or that of the words.

A person struck with cortical deafness will not only fail to understand the words, and to appreciate the meaning of the sounds, but he will no longer hear the sounds themselves.*

II.—*Word-deafness*.—This affection may be defined as an auditory amnesia, or loss of the memory of the signification and value of the articulated sounds which constitute phonetic language.

The word-deaf is not deaf to sounds, and there is no hindrance to the passage of impulses from the aural

* Gilbert Ballet. "Le Langage Intérieur," pp. 75, 76, 77.

apparatus to the cortex of the brain ; in fact, the auditive sensitiveness is sometimes so acute that the patient is susceptible to the slightest acoustic impression ; he will hear the ticking of a watch, and even the fall of a pin upon a table ; his attention will be attracted to the noise of the wind rushing through the trees, and when whistling or noise of any other kind is made in his vicinity, he will turn round with intelligent expression to discover from whence the sound has emanated which has been conveyed to his auditory centre. Word-deafness, therefore, is a purely psychical defect ; the patient hears what is uttered in his presence, but to him it is a confused noise ; the words used fail to revive in his memory corresponding ideas, and the effacement of auditory images is the pathogenetic condition of this singular affection.

The following case, reported by M. Giraudeau, affords an excellent and typical illustration of word-deafness, and it is all the more interesting from the fact that uncomplicated examples of this form of sensory aphasia are comparatively rare, as this affection is commonly, if not frequently, associated with word-blindness, and also with more or less motor defect. The clinical history of the patient comprises most of the symptoms which recent writers mention as characteristic of word-deafness ; and an additional interest attaches to this observation from the fact that it was completed by a careful post-mortem examination.

Marie Bouquinet, aged 40, a laundress, was admitted into the L'Hôpital Saint Antoine, under the care of Professor Hayem, on February 22nd, 1882. In her antecedent history there was nothing that pointed to syphilis or to intemperate habits. She had never before been the subject of any disease ; she, however, had never

menstruated, and for three months had suffered from a constant headache, affecting both sides of the head, with a nocturnal exacerbation of such a character as to render sleep impossible, the headache at times being so violent as to cause her to cry out from the severity of the pain. She had never had vomiting, loss of consciousness, or any epileptiform attack.

For upwards of a month before admission she was obliged to give up work in consequence of the severity of the pain ; at about the same time, it was observed, that she no longer understood what was said to her, and that she did not answer when spoken to. This information was obtained from the persons who accompanied her to the hospital, as the patient was unable to supply it herself.

Condition on admission.—The patient is very stout, there is no fever, the right pupil is slightly dilated, and there is severe headache. When asked her name, she raises her head, but does not answer. Asked a second time, she answers, “What do you say?” and on the same question being put a third time, she says, “I don’t understand.” If she is asked a fourth time, she answers correctly, “Marie Bouquet.”

On being asked, “How long have you been ill?” she evinces the same difficulty of understanding, but replies, after a time, “Three months.” If she is asked to give her address, she replies, “Perhaps for three months and a-half.” Being interrogated as to her occupation, she presents the prescriptions of the physician who treated her in the town, and adds, “A white powder” (sulphate of quinine).

On several occasions we changed our mode of interrogation, but the replies of the patient were always analogous to those mentioned above. After having, with great difficulty, made her understand a question by frequent repetition, she answers ; but, whatever subsequent questions are put to her, she follows her first idea, and her subsequent replies have no relation whatever to the questions put to her. Sometimes, however, it is impossible to make her understand our meaning at all, and to every question addressed to her she invariably replies, “What do you say? I don’t understand. Cure me.”

Her hearing, however, is unaffected ; there is no discharge from the ear ; she hears the ticking of a watch, and turns her head at any slight noise made near her. Vision is good in both eyes, and

there is no word-blindness, for she can easily read the headings of the bed-ticket ; and to the question put to her, she replies verbally or in writing, after a little reflection. Tactile sensibility is preserved, as well as the sense of taste and smell ; and the motor power is unaffected.

Without entering into further details, suffice it to say that the psychical affection rapidly increased, and on the ninth day after her admission the word-deafness was complete, and whenever she was addressed, she invariably said, " I do not understand," and then began to weep. The next day she fell into a state of coma and died.

At the necropsy, a sarcomatous tumour of the size of a walnut was found occupying the posterior part of the first and second temporo-sphenoidal convolutions of the left hemisphere ; the rest of the brain being healthy.*

In the above history we have a typical instance of a psychical trouble, characterised by an inability to understand spoken words, although the organ of hearing itself was unaffected. The names of objects and persons uttered in the presence of the patient failed to revive in her mind corresponding auditory images, showing that the part of the apperceptive faculty of speech which is in relation with the sense of hearing, was disordered. It will be observed that, although the auditory impressions of words were not revived, the visual and kinæsthetic memories were unaffected, for the patient could read, speak, and write.

As it is only of late years that the pathology of word-deafness has been understood, the subjects of it have frequently been considered as deaf or demented. Bernhardt mentions an instance of a word-deaf consulting an aurist, who, finding there was nothing the matter with

* C. Giraudeau. Note sur un cas de Surdit  Psychique. Revue de M decine, 1882, tome ii., p. 446.

the auditory apparatus, referred him to Bernhardt, as suffering from disease of the brain.* Baillarger† and Wernicke‡ have both reported cases in which the patients were regarded as insane; and as in word-deafness there is frequently a certain amount of paraphasia, I think it extremely probable that many suffering from this affection have found their way to the lunatic asylum. The careful clinical observer of the present day will scarcely fall into this error, for, as Kussmaul says, "the patients may have perfectly correct ideas, but the correct expression for them is wanting; the words, and not the thoughts, are confused. They could even understand the ideas of others, if they could only understand the words. They are in the position of persons suddenly set down in the midst of a population which uses the same sounds but different words, these striking upon their ears as an unintelligible jargon."||

Sometimes the perception of musical sounds is abolished as well as that of articulate language; in Bernhardt's case, already quoted, the patient was unable to recognise well-known airs sung in his presence. Grant Allen has reported a case in which the psychical defect was exclusively musical:—

A young man, aged thirty, was the subject of the following strange sensorial defect. If two adjacent notes upon a piano were struck, he was quite incapable of perceiving any difference between them; after careful and deliberate comparison, he would declare the two sounds to be exactly alike. If the same notes were sung by the human voice, he was equally unable to discriminate between

* "Centralblatt für Nervenheilkunde" (1882).

† "Bulletin de l'Académie de Médecine," tome xxx., p. 828.

‡ "Der Aphasische Symptomencomplex," fall i., u. 2.

|| "Die Störungen der Sprache," s. 177.

them. Further, if any note, say C, was played on the piano, and another note at a considerable interval, say E or A in the same octave, was subsequently played, he could not notice any difference between them. As to his general capacity for hearing, he did not seem to differ much from ordinary persons; his power of distinguishing non-musical sounds was quite up to the average, and his hearing was unusually acute.

Mr. Grant Allen, in commenting upon this strange history, says that there are two facts in connection with it worthy of notice for their wider psychological bearing. The first is, the absolute indifference to the vast mass of musical sounds. If engaged in mental work, and a German brass band, or a barrel organ were grinding discord under his very ears, he would be quite unconscious of the fact until his attention was called to it. Music, in fact, under ordinary circumstances, quite escaped his observation. The second point is the converse aspect of the same peculiarity. Whenever circumstances compelled his attendance at a concert, a choral service, or a musical party, where no other occupation was possible, this young man would suffer from the most intense *ennui*, which became after a time almost insupportable. The music being an absolute matter of indifference to him, the effect was the same as if he were made to sit quietly in an attitude for two or three hours, while nothing whatsoever was taking place. Mr. Grant Allen characterises this singular defect as "Note-deafness."^{*}

From the description I have given of word-deafness, it will be observed that it implies the *complete* loss of the auditive images of words; but akin to this affection there is a slighter disorder, of which I have already given several examples, in which the failure in the memory of auditive representations was limited to substantives or to proper names, &c., and to this form the name of Verbal Amnesia has been given. Although, perhaps, there is only a difference of degree between verbal amnesia and word-deafness, the symptomatic aspect of the two affec-

* "Mind," April, 1878, p. 157.

tions is widely different. With the amnesic, the idea of an object or of an event is represented in consciousness, but it fails to revive the corresponding word in his memory ; but although he cannot *spontaneously* revive his auditory images, if he is prompted and the proper words are pronounced before him, the hearing of the words will revive the dormant verbal image. A good example of verbal amnesia was furnished by Sainty, whose history I have reported amongst my own personal observations (vide page 103). It will be remembered that when shown a purse, and asked to say what it was, he replied, "I cannot say the word ; I know what it is ; it is to put money in." "Is it a knife?" "No." "An umbrella?" "No." "A purse?" "Yes." Here it will be seen that he seized the meaning of the word as soon as it was pronounced before him. It is quite different with the patient afflicted with word-deafness ; in vain his auditory centre may be stimulated by pronouncing the proper words in his presence, the auditive image has been completely effaced and exists no longer in his brain, and no external influence can resuscitate it.

12.—Word-blindness is also a form of verbal amnesia in which the patient has lost the memory of the conventional meaning of graphic symbols. Vision is unimpaired, the eye, as an optical instrument, is perfect, and the ophthalmoscope will disclose no structural defect. The patient sees the words, but no longer understands their meaning, and he is exactly in the same position as if he had never learnt to read ; but, strange to say, he can write under dictation (that is, if there be no word-deafness) ; he can even express his thoughts by writing, but is incapable of reading what he has himself written.

I must once more refer to the extremely valuable work of M. Ballet, who, in his chapter on Word-blindness, or the partial or total effacement of the visual images of words, establishes analagous distinctions to those observed in Word-deafness, and under the generic term of Word-blindness (*La cécité verbale*) he recognises the following three varieties :—

1. Cortical blindness (*La cécité corticale, Rindenblindheit*) is the loss of the perception of luminous impressions.
2. Psychical blindness (*La cécité psychique, Seelenblindheit*) is the loss of images commemorative of objects, with at least partial preservation of luminous vision.
3. Word-blindness, properly called (*La cécité verbale, Wortblindheit*), is the loss of the vision of words, or, in general terms, of written symbols.

The form of cortical blindness that is observed clinically is not a true blindness, inasmuch as it affects only half the field of vision ; it is a *hemiopia*, and from that portion of the field of vision which remains intact, the patient continues to perceive the light, and one is thus able to judge whether he recognises objects and understands signs.*

A striking example of Word-blindness is reported by M. Charcot. It formed the subject of one of the learned Professor's celebrated lectures on Diseases of the Nervous System, at La Salpêtrière ; and as the patient was under close observation for a considerable time, the clinical symptoms could be studied under conditions exceptionally favourable for physiological analysis. The following is a brief summary of the most important features of this interesting and classical case :—

* G. Ballet. Op. cit. p. 97.

A merchant, aged thirty-five, after unusual excitement in the hunting-field, was suddenly seized with right hemiplegia and loss of consciousness. The next day, on recovering consciousness, he stammered in speaking, substituting one word for another. There was a little paraphasia at this time, for his wife relates that he said, "I have one hand in the sun"; he recognised persons and objects, but was unable to designate them by name.

At the end of three weeks the disturbance of speech had almost entirely disappeared, and he would merely substitute occasionally one word for another; the hemiplegia had been gradually subsiding, and the motor power had so far returned in the hand, that he could write very legibly. Now occurred the following extraordinary incident. Wishing to give some order in reference to his business affairs at home, he took a pen and wrote down his directions; then, thinking that he had forgotten something, he asked to see the letter that he had just written, but he was unable to read it, thus exhibiting in all its originality the strange phenomenon, *that he had been able to write, but was quite unable to read his own writing!* He was also unable to read printed matter.

On analysing more closely the last-named symptom, it was observed that he could write a long letter without any notable mistakes in orthography. "I write," says he, "as if I had my eyes shut; I do not read what I write." In fact, he wrote quite as well with his eyes closed. Having written his own name, he was asked to read it. "I know very well," said he, "that it is my name that I have written, but I can no longer read it."

A few days later another curious symptom was observed. Wishing to try and play at billiards, he was able to grasp the cue properly with his right hand, but he found he was unable to play; the inability depending on the fact that there was obscuration of the right half of his visual field, for he could see only half the ball that he was about to strike, and he lost sight of the balls altogether as soon as their position corresponded to the right half of the field of vision. He was, in fact, the subject of right-sided homonymous hemianopsia.

From an analysis of the above clinical history, it will be seen that the patient had lost all idea of the symbols

of written language from the *receptive* point of view ; whilst he had retained the phenomena of auditive *reception*, as well as those of graphic and verbal *transmission*.

Dr. Ross, in a chapter on Sensory Aphasia, mentions the case of a man, aged fifty-seven, the subject of diabetes, who, when asked to read, would make very elaborate preparations, and then utter a few sentences which had not the remotest connection with anything that was before him on the printed page. In speaking of him, his wife volunteered the following information to Dr. Ross. "He has given over attempting to read the newspaper now," she said. "A short time ago," she continued, "I hardly knew what to do with him. He tried to read the newspaper, and he kept saying, 'I don't know what is the matter with the papers now-a-days, they are filled with such silly stuff.' I frequently had to get him as many as four newspapers in a day, to see if it would satisfy him. At last I was obliged to tell him that it was not the newspapers that were wrong, but that it was he who could not read ; and now he has given over trying." This patient also had a right-sided bilateral homonymous hemianopsia.*

The diagnosis of this affection may occasionally admit of some difficulty ; for instance, the remarkable case of Dr. Osborne, that I have quoted at page 197, might at first sight seem to be one of Word-blindness. When asked to read from a book, he made use of strange and totally unmeaning expressions, having no connection whatever with the printed text ; but it is evident that his utterances were not in accordance with his mental impressions, for Dr. Osborne clearly ascertained that, in

* Ross. "On Aphasia," p. 13.

spite of the jargon he used, he really understood the sense of what he was purporting to read. It is, moreover, stated that he perfectly comprehended printed language; that he continued to read a newspaper every day, and that, when examined, it was ascertained that he had a very clear recollection of all that he had read, notwithstanding that he would employ an unintelligible gibberish, if asked to read it aloud. Such a case certainly ought not to be considered as one of Word-blindness—a term that should be restricted to those cases in which the patient does not appreciate the meaning of printed or written words.

On analysing the condition of this patient, it will be seen that the *centripetal* conducting paths of the receptive department of the sensory function of speech were unaffected; it was the *centrifugal* function that was impaired; the disorder was not in the ingoing or impressive function, but in the outgoing or expressive function; or, in other words, it was a motor defect, or one of transmission.

Pathology.—Although so much has been recently written about Word-deafness and Word-blindness, science is not able to speak very dogmatically about the exact seat of lesion in these affections, and we must rest contented with a more or less probable hypothesis, as, although the motor region of the cortex cerebri has been mapped out with marvellous precision and exactitude, a less satisfactory result has been attained in reference to the localisation of sensorial centres.

In Word-deafness the lesion is generally supposed to be in the first, and possibly also in the second, temporo-sphenoidal convolutions of the left hemisphere, the sup-

posed centre for the auditory perception of words. The first temporo-sphenoidal convolution was diseased in every one of seventeen cases of Word-deafness collected by Sepelli.* The researches of Schäfer and Sanger Brown, however, do not support the above localisation. In six monkeys, they more or less completely destroyed the superior temporal gyrus upon both sides; and, in one experiment, they separated up the fissures bounding the gyrus, and scooped it out entirely from the very bottom of the fissures, so that not a trace of the convolution in question should remain. In all six cases the result was the same; hearing was not only not permanently abolished, but it was not perceptibly affected. The animals, even immediately after recovering from the anæsthetic, reacted to slight sounds of an unusual character, such as a slight smacking of the lips or the rustle of a crumpled newspaper. Some of them were under observation for several months, and there was never any doubt as to the full possession of their auditory faculties.†

Dr. Bastian, who, with other writers, recognises a general auditory centre, as well as an auditory word-centre, leans to the localisation of the latter in the first temporo-sphenoidal convolution; and, in commenting on the results obtained by Schäfer and Sanger Brown, remarks that experiments on monkeys are of a negative character, and cannot be said to afford any definite evidence against a presumption which is based upon clinico-pathological evidence.‡

* "Rivista Sperimentale di Freniatria," 1884, p. 94.

† "Experiments on Special Sense Localisation in the Cortex Cerebri of the Monkey," by E. A. Schäfer, F.R.S.—*Brain*, Jan., 1888.

‡ "On Different Kinds of Aphasia."—*British Medical Journal*, Oct. 29th, 1887.

In Word-blindness the lesion is located by most observers in the angular gyrus and adjoining part of the parietal lobule of the left hemisphere, but the most conflicting results have been obtained by different observers upon this point, and the precise localisation of the morbid condition producing word-blindness has yet to be established by subsequent clinical and *post-mortem* evidence.

At one time Ferrier localised the visual centres in the angular gyri, to the exclusion of the occipital lobes. In his first experiments, antiseptics were not used; and hence he says that some degree of inflammatory action and consequent disturbance of the grey matter in immediate relation with the actual lesion were unavoidable. In his later researches with Professor Yeo, in which stringent antiseptic precautions were employed, different results seem to have been obtained.

From these experiments Ferrier draws the following conclusions:—"That, though the occipital lobes are included in the visual centres, it is nevertheless a remarkable fact that they can be injured, or cut off bodily, almost up to the parieto-occipital fissure, on one or both sides simultaneously, without the slightest appreciable impairment of vision. . . . That unilateral destruction of the angular gyrus produces only transient loss of vision in the opposite eye; and that even bilateral destruction of the angular gyrus does not cause permanent total loss of vision. When, however, the angular gyrus and occipital lobe are together destroyed in the one hemisphere, transient amblyopia occurs in the opposite eye, and more or less enduring hemiopia in both eyes towards the side opposite the lesion, by reason of paralysis of both retinæ on the side corresponding to

the lesion. This condition of hemiopia, first pointed out by Munk, has been erroneously attributed by him to lesion of the occipital lobe alone, owing to the imperfection of his experimental methods." Further on, Ferrier summarises his views as follows:—"It appears to me, therefore, that, in addition to the representation of the correlated halves of both retinae in the corresponding occipito-angular region, the angular gyrus is the special region of clear or central vision of the opposite eye, and perhaps, to some extent also, of the eye on the same side."*

The recent researches of Professor Schäfer and Dr. Sanger Brown have given different results, and do not bear out Ferrier's conclusions. These physiologists destroyed in a monkey the angular gyrus, first on one side and then on the other, without any appreciable defect being produced, either in the animal's "visual perceptions, or its ocular movements, or in the sensibility of the globe of the eye." This animal was kept for several months, and submitted to careful and general observation, and was also exhibited at a recent meeting of the London Neurological Society.

As it might be objected that although the cortex of the angular gyrus had been destroyed right up to the fissures bounding it, still some portion might have been left at the bottom of these fissures, it was determined in another animal to make a complete removal of the gyrus angularis in its whole depth and extent. The lips of the fissures were accordingly separated, and the entire gyrus angularis of one side was scooped away, producing thereby a gap in the surface of the brain of considerable

* "Functions of the Brain," 2nd edition, pp. 273, 284, 288.

depth. This operation was followed by a disturbance of visual perceptions; but the disturbance was not amblyopic, it was distinctly hemiopic; this condition having lasted for a few days only, gradually passed off, leaving vision unimpaired.

These observers then continued their experiments on the occipital lobe, which they entirely removed by a vertical incision carried along the line of the parieto-occipital fissure, leaving intact the angular gyrus. The result was the immediate establishment of a permanent bilateral homonymous hemianopsia, which persisted during the whole time that the monkey was kept alive. Objects so placed that their images fell upon the left half of the retinae, were taken no notice of; a threatened blow coming from the right-hand side of the mesial visual plane was not winced at or avoided; currants strewn upon the floor were only picked up towards the left side, the animal working round in that direction. In another monkey both occipital lobes were removed, leaving the angular gyri intact; the result was total and persistent blindness. The animal could only find food by groping and smelling; brought into a strange place, it ran against every obstacle; placed in a dark room, and with light flashed upon it, no signs of perception were given.

Schäfer, in commenting on the above experiments, suggests that the opposite results obtained by Ferrier, who removed both occipital lobes *without any symptoms of defective visual perception*, were due to the fact that the removal was incomplete.*

Dr. Gowers, in his recently published work, speaks very positively as to the point in dispute in reference to

* Schäfer. Op. cit., pp. 3, 5, 7.

the visual centre. "Numerous observations," he says, "have established beyond question the fact that hemianopia results from disease of the optic lobe, which thus constitutes a centre for the fibres from the same-named half of each retina, and receives impressions from the opposite half of each field of vision. . . . But disease sometimes causes, not hemianopia, but 'crossed amblyopia,' *i.e.*, dimness of sight in the opposite eye, generally with concentric diminution of the field. The theory which best explains the fact is that on the outer surface, in front of the ~~optic~~ lobe, there is a higher visual centre, in which the half fields are combined, and the whole opposite field is represented. Such a centre in animals is localised by Ferrier in the angular gyrus (in which term he includes the extremity of the supra-marginal convolution). Pathological evidence in man points to some part of the same region as the seat of this centre."*

* "Diseases of the Nervous System," Vol. II., p. 18. It will be observed that Dr. Gowers actually uses the word *optic* in speaking of the occipital lobe. In further pursuance of this subject, he elsewhere remarks "that the part of the brain concerned in the perception of visual word-symbols seems to be in the lower and hinder part of the parietal lobe, also on the left side of the brain. Disease of this part has caused inability to read even the simplest word, a condition that has been termed 'word-blindness.' Of the cases recorded by Sepelli, in each one in which word-blindness co-existed with word-deafness, the disease extended into this part of the parietal lobe. This region, as we have seen, is probably the seat of the 'higher visual centre,' and transient 'mind-blindness' has been caused by its disease, *i.e.*, an inability to recognise not only words, but objects also. . . . We have seen that the visual path passes on each side by the optic tracts to the optic thalamus, and thence by the optic radiation to the cortex of the optic lobe. This constitutes a half-vision centre which seems to be double, for light and for colours. The two half-vision centres are probably blended in a higher visual centre in front of the optic lobe. The arrangement, however, is very complex; in each centre both fields are represented, but

ERRATUM, p. 234.

The Author wishes to call attention to an oversight in transcribing from Dr. Gower's work—the word "optic" has inadvertently been substituted for "occipital." In consequence of this error, the comment upon the word "optic" in the foot-note becomes a mis-statement.

At the moment of writing the above lines, my attention has been called to an important communication by M. Chauffard, in which he gives a detailed account of sudden blindness occurring in a patient under his charge, where, after death, there was found lesion of both occipital lobes.* In the same article, amongst various other similar instances, M. Chauffard quotes the following, as he terms it, experimental case, reported by Pflüger in the *Berliner klinische Wochenschrift* for 1885:—A young man received a gunshot wound in the occipital region, and was struck with sudden blindness; death occurred on the 39th day, and the autopsy revealed extensive lesions of both occipital lobes, in which a certain number of shots had lodged.

Amongst the different writers on this subject, I must not omit Dr. Nadine Skwortzoff, who, in summarising the results of various observers, says that although differences of opinion exist as to the precise seat of the visual centre, they all admit that this centre is in the posterior part of the brain, and that it does not extend in front beyond the gyrus angularis.†

chiefly that of the opposite eye. Each higher visual centre can supplement its fellow to some extent and compensate its loss, but in the half-vision centres there is no power of supplemental action, and no compensation for loss is possible. . . . In connection with the interference of the higher visual functions of the brain, it may be noted that the area of the cortex, which is apparently related to these functions, is very extensive. In no part of the brain is the difference greater between the brain of the monkey and that of man than in this region, between the extremity of the fissure of Sylvius and the optic lobe. This region in man exceeds in size the whole of the brain of the monkey."—Pp. 104, 133, 151.

* Chauffard. *De la Cécité Subite par lésions combinées des deux lobes occipitaux (Anopsie corticale)*. *Revue de Médecine*, Février, 1888, p. 131.

† "De la Cécité et de la Surdit  des Mots."—*L'Enc phale*, Oct., 1881, p. 215.

It will be observed that the two cases of word-blindness that I have quoted were complicated by right-sided bilateral hemianopsia, a symptom frequently associated with word-blindness. According to the recent researches of M. Charcot, who has investigated this subject very minutely, it would seem that in hemianopsia of cortical origin, the lesion occupies nearly the same region as in word-blindness. M. Charcot, however, expresses this opinion with a certain amount of diffidence, observing that if word-blindness and hemianopsia had precisely the same seat in the brain, the two clinical phenomena should be always associated, which seems not to be the case, as cases can be quoted of hemianopsia without word-blindness, and also of word-blindness without hemianopsia.*

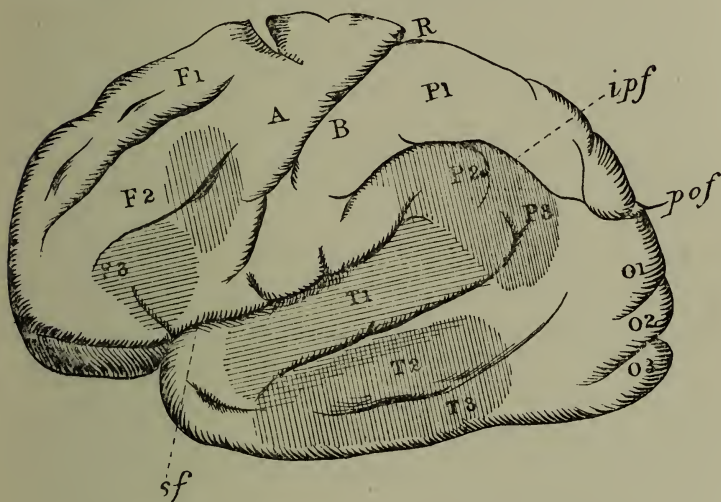
Dr. de Watteville, after stating that word-blindness is sometimes accompanied by hemianopsia, and at other times unattended by any visual trouble, remarks that the post-mortem results in this affection are not identical; the lesion, according to him, occupying sometimes the angular gyrus, and at others the first temporal convolution. He explains the occasional dissociation of word-blindness and hemianopsia, by recognising that the former may arise from three distinct and separate causes: lesion of the visual centre; lesion of the auditory centre; and lesion of the audito-visual commissure. In the last two instances no hemianopsic trouble can complicate the word-blindness, which can only appear in all its purity when the lesion affects the commissure.†

The diametrically opposite conclusions at which different physiologists have arrived, leave the question

* Charcot. *Maladies du Système Nerveux*, tome iii., p. 171.

† *Le Progrès Médical*, 21 Mars, 1885.

of the localisation of the lesion in Sensory Aphasia still undecided; the accompanying plate, however, may be deemed to represent approximately, if not with absolute accuracy, the views of the majority of the writers on this obscure branch of cerebral pathology.



External surface of the left hemisphere of the Brain.

(After Ross.)

R—Fissure of Rolando; *Sf*—Fissure of Sylvius; *ipf*—Interparietal fissure; *pof*—External parieto-occipital fissure; *F*₁, *F*₂, and *F*₃—The first, second, and third frontal convolutions; *A* and *B*—The ascending frontal and parietal convolutions respectively; *T*₁, *T*₂, and *T*₃—The first, second, and third temporo-sphenoidal convolutions; *O*₁, *O*₂, and *O*₃—The first, second, and third occipital convolutions; *P*₁—The superior parietal lobule; *P*₂—The inferior parietal lobule; *P*₃—The angular gyrus. The shaded part on *F*₃ corresponds to the localisation of the lesion in *aphemia*; on *F*₂ to *motor agraphia*; on *T*₁ to *word-deafness*; on *T*₂ and *T*₃ to *verbal amnesia*; and on *P*₂ and *P*₃ to *word-blindness*.

I need scarcely say that experiments on animals are utterly worthless for elucidating the theory of word-blindness; and even in reference to the visual centre itself, the results obtained from observations on animals

can scarcely be considered as rigorously applicable to man.

Although the evidence of those who have investigated the subject is of a most conflicting character, it must be conceded that the general consensus of opinion places the lesion in Sensory Aphasia in the area of distribution of the parieto-sphenoidal and sphenoidal branches of the left middle cerebral artery; but the contradictory opinions now prevalent as to precise localisation, can only be reconciled by more extensive and accurate clinical and pathological records.

13.—I have quoted several cases in which the aphasia was of an intermittent character, and the patients regained the power of speech as suddenly as they lost it. The clinical history of R. Dalliston, which I have detailed at great length (page 136), is a good illustration of this form, as also the following observation recorded in *L'Encéphale* for March, 1883, the subject of it being a medical practitioner:—

A provincial physician, previously in the enjoyment of excellent health, was summoned to a patient at some considerable distance from his own house; and whilst traversing a forest, he wished to inquire his way of some wood-cutters whom he met, when he found he was unable to articulate a single intelligible word. No premonitory symptoms ushered in this sudden attack of aphasia; he had experienced no feeling whatever of discomfort, and had hitherto been free from any bodily ailment, except occasional attacks of *migraine*.

A few minutes before the attack he felt tingling and convulsive twitchings in the right hand, and, as he was driving, the reins fell from his hand. Being alarmed, he quickly returned home, but was unable to tell his wife what had happened. He then made a sign that he wished to write, but when pen, ink, and paper were brought to him, he found himself as incapable of expressing his thoughts by

writing as by articulate speech. After several fruitless attempts, he succeeded in pronouncing the word "blood." This was understood by the bystanders that he wished to be bled, and twenty leeches were applied to the anus. He then lost consciousness, and was seized with epileptiform convulsions, followed by a state of coma which lasted several hours. On recovering consciousness he could say a few words; the speech gradually improved, and forty-eight hours after the commencement of the seizure, he spoke as well as ever, and there remained no trace whatever of this singular attack.

About a month afterwards this gentleman had a recurrence of the above symptoms, the aphasia, however, lasting only twenty minutes. During the next three years he had twenty-nine similar attacks, varying in duration from ten minutes to several hours, and on two occasions lasting over twenty-four hours. In almost every instance there was more or less tingling and convulsive movement of the right arm. During the interval between these attacks the patient enjoyed excellent health, with the exception of occasional headaches, to which he had been subject nearly all his life.

Professor Ball, the editor of *L'Encéphale*, in commenting upon the above singular clinical history, says that the marked intermittence of the symptoms, and their exceedingly short duration, are irreconcilable with a diagnosis of organic lesion; and in the absence of any appreciable disease of the heart or blood vessels, he considers the morbid condition to be the result of functional cerebral ischæmia, and in support of this view he calls attention to the fact that a remarkable aggravation of the symptoms resulted from the application of leeches, which caused a still greater impoverishment of the blood.

14.—There is a variety of aphasia characterised by this peculiarity—that although the subjects of the affection can articulate nothing else whatever, they can give vent to an oath; and thus, in the heat of passion or

excitement, they give spontaneous or automatic utterance to words or phrases expressive of strong emotion—ejaculations not always correct as regards taste or ethics, and which the patient is wholly unable to reproduce when the stimulus of emotion is wanting. It would thus seem that the capacity for producing words for the purpose of expressing thought may be lost, while the capacity for uttering interjectional words may be retained.

I have already incidentally alluded to a case of Dr. Hughlings Jackson, in which the patient had recovered the power to swear, although continuing aphasic.* Dr. Gairdner mentions the case of a patient in the Edinburgh Royal Infirmary whose sole means of communication with others was by signs. After a time, Dr. Gairdner noticed that the other patients believed he was shamming, and, on inquiry, they gave as a reason for their opinion, that he could swear. The man shortly afterwards died suddenly, when his brain was found to be the seat of a large number of minute deposits of cancer.†

Dr. Hughlings Jackson hints that these oaths and interjectional expressions as observed in aphasic patients, may be due to reflex action, and he goes on to say:—“It is quite obvious that they are not voluntary, as the patients cannot repeat the phrases. The will cannot act, but somehow an emotion, e.g., anger, gets the words passed through the convolution of language. Just as a paralysed foot will jump up when the sole is tickled, so these words start out when the mind is excited. Such ejaculations seem to have become easy of elaboration by

* Hughlings Jackson locates the automatic power of uttering words in the right hemisphere, and the voluntary power in the left. Kussmaul combats, and I think successfully, this hypothesis.

† “On the Function of Articulate Speech,” p. 14.

long habit, and require but slight stimulus for perfect execution."*

15.—Aphasia is not an uncommon accompaniment of hysteria; the onset of the symptom being usually sudden, and its duration extremely uncertain, the loss of speech varying from a few minutes to several days, or even months.

Dr. Graves has quoted a case observed by Dr. Richter, of Wiesbaden, of an hysterical female who regularly became speechless every day at four o'clock, p.m.; consciousness did not appear to be at all impaired, but there was a feeling of weight about the root of the tongue, and the paroxysm went off with a large evacuation of watery urine, accompanied by perspiration and sleep. This periodical aphasia was cured by large doses of quinine.† Another most striking instance of the connection between loss of speech and hysteria is recorded by Dr. Wells, the subject of it being a woman aged forty-three, who had been subject to fits of an hysterical character for a long time; on recovery from one of these she found herself entirely deprived of the power of speaking, or even of making any noise whatsoever with her voice, though she was at the same time in full possession of every other faculty, both mental and bodily; strange to say, her recovery of speech coincided with the occurrence of the next hysterical fit, which took place ten days later.‡

In the "*Progrès Médical*," No. 9, 1876, Louville and Debove describe the case of a girl, eighteen years of age, who, in consequence of hysterical paralysis of the vocal cords, became at length quite dumb. The authors, by

* London Hospital Reports, Vol. i., p. 454.

† "*Dublin Journal of Medical Science*," Jan., 1834, p. 419.

‡ "*Medical Communications*," Vol. ii., p. 501. London, 1790.

firm and painful pressure in the region of the ovaries, produced a well-marked hysterical paroxysm. During the attack, the patient, for the first time after a long period, began to scream and to speak with a low voice. Repetition of the procedure brought back the voice entirely, but the disordered condition of the nervous system remained.

Kussmaul cites the case of a lady, aged thirty-one, who was the subject of hysteria, and who suffered from paralysis of the legs and of the left arm. At intervals she lost the power of speech for hours and days at a time; but pressure on any spot in the lateral regions of the neck always relieved the aphasia immediately.*

Hysterical mutism formed the subject of one of M. Charcot's classical lectures at La Salpêtrière. The clinical history upon which he founded his remarks was that of an artisan, aged thirty-three, who, up to the age of thirty, had been subject to attacks of a hysterio-epileptic character. He married, and these attacks ceased. Shortly afterwards, without any known cause, other than laryngitis accompanied by aphonia, he suddenly became mute. He could neither speak, phonate, or whisper, although able to move his tongue and his lips in every direction; he was, however, able to convey his thoughts in writing. At the end of some weeks his speech suddenly returned, after the use of the laryngoscopic mirror! A few weeks later on, the mutism was reproduced during a fresh attack of laryngitis.

M. Charcot, in commenting upon this case, remarks that the affection is essentially of a dynamic nature, and in analysing the symptoms observed in hysterical

* Op. cit., p. 201.

mutism, he lays stress on the inability to whisper. Whispering, he says, is nothing but a spoken and articulate language, and is absolutely independent of the laryngeal voice; Marey in 1876, and Boudet in 1879, having by their experiments established that in whispering the larynx takes no part, the vocal cords not entering into vibration; the air traverses the larynx in the same manner as it passes through the trachea, as through an inert tube.

Although the patients have retained the entire use of the common movements of the tongue and lips, and are able to move these organs with agility in all directions, so as to be able to whistle, they are totally unable to articulate a single word even in a whisper. They are mute, in the rigorous sense of the term; in fact, they are more than mute, for whilst it is possible for the deaf-mute to make various noises, the hysterical mute is voiceless.

Hysterical mutism, it would seem, can be produced artificially by hypnotism. The patient being plunged into the somnambulistic period of hypnotism, M. Charcot begins by talking to her for a few seconds; then getting nearer to her, he pretends neither to hear her or to understand her, and tells her that she cannot speak. The patient soon becomes aphasic and voiceless (aphone), showing signs of distress at not being able to answer questions.*

Sometimes spasmodic mutism coincides with hysterical trismus, as in two instances mentioned by Dr. Bright.†

Some years since, a girl, eleven years of age, was admitted under my care into the Norfolk and Norwich

* Charcot. "Maladies du Système Nerveux," tome iii., p. 422.

† "Bright's Reports of Medical Cases," Vol. ij., part 2, pp. 459, 460.

Hospital, who, after exposure to cold and damp, was brought to the institution because her mother found she was unable to speak. On examining her, it was found that there was a forcible closure of the lower jaw; but the moment the mouth was pressed open she could speak as before.

I formerly attended the widow of an eminent physician, who would sit for hours together with the head forcibly extended on the cervical spine, and who whilst in this position never spoke a word. The intellectual powers of this lady were unimpaired.

"There is," says Dr. Bergmann, "a fixity of thought, as well as a flight of thought, an intellectual catalepsy and chorea." The same may be said of the process by which these thoughts are communicated to the outer world, for it would seem that loss of speech may occur as a cataleptic symptom, and Dr. Todd, in writing about a case analogous to those mentioned above, uses the term catalepsy in his description of it.

A curious case of a similar nature is recorded by Willis, which he calls "paralysis spuria." His description is so quaint that I am tempted to transcribe it:—
*"Curo jam nunc fœminam prudentem et probam, quæ per plures annos hujusmodi spurix paralysi non tantum in membris sed etiam in linguâ obnoxia fuit; hæc per tempus quoddam libere et expedite satis loquitur, post sermones tamen longos, aut illos festinanter et laboriose prolatos, illico sicut piscis obmutescens, amplius ne gry quidem proloqui potest, porro nec nisi post horam unam, aut alteram vocis usuram ullam recuperat."**

* Op. T. Willis, M.D., "De Paralysi, De animâ Brutorum," cap. ix., p. 149.

CHAPTER VIII.

Etiology of Aphasia. May be congenital; deaf-mutism; the loquular defect in Idiots—Dr. Kerlin's statistics. May be the result of exostosis of the cranial bones; of thrombus of the cerebral arteries; of tumours or abscess in the brain, &c. Dr. Macewen on the Surgery of the Brain. Gowers on irritative inhibition. Traumatic Aphasia, or loss of speech caused by direct injury to the brain—Baron Larrey, Simon, &c.; three cases observed by the author. Loss of speech the result of vaso-motor paralysis; of atmospheric changes; of the action of certain drugs; of simple molecular disturbance of the brain cells; of the bite of venomous snakes, &c. Puerperal Aphasia.

Having noticed the different forms in which loss or lesion of the Faculty of Articulate Language is met with by the clinical observer, I now propose to consider the various causes which give rise to this morbid symptom.

The study of the etiology of any disease affords one of the best clues to a clear knowledge of its nature and probable course; and as the pathology of aphasia is involved in so much obscurity, it seems especially desirable carefully to review the various circumstances, physical and moral, under which defects in the power of speech have become developed.

Some may think that it is illogical to attempt any systematic classification of the causes which may induce what I admit is only a symptom; but it seems to me that there is a practical convenience in studying aphasia from an etiological point of view, as furnishing a pivot around which to group, with something like method, our positive knowledge of this intricate subject.

Causes.—A variety of morbid conditions may produce loss or lesion of the faculty of speech.

1.—It may be congenital, as in the deaf and dumb; although, strictly speaking, the silence of the deaf-mute is not true mutism; for when deafness is congenital, or occurs at an early age, the inability to speak is due simply to the fact that the child cannot by the usual means be taught to employ words or construct sentences—in fact, he is simply deaf, the ear only being at fault; the organs of voice and speech are in their normal condition, and are quite capable of being roused into action, and he would speak if only he could hear; in fact, the causes of deaf-mutism differ in no respect from those of ordinary deafness, except that they come into operation during intra-uterine life or during childhood.*

It may therefore be said that the child is not born deaf

* Kussmaul has an interesting chapter on deaf-mutism, in which he says that the age of puberty is the latest period of life at which deafness can deprive persons of the power of speech which they had already acquired.

In most of the cases of deaf-mutism acquired after birth, this infirmity is developed during the first four years of life; from that period to the tenth year the cases become progressively less numerous, and those in which it is developed between the tenth and fourteenth years are exceedingly rare. Previous to puberty the word-pictures (*Wortbilder*) have not made so lasting an impression on the memory as is the case at a later period, when deafness, although it may seriously impair the pictures (*Bilder*), is no longer able to efface them altogether.

Kussmaul also gives some curious statistics in reference to deaf-mutism, which, he says, is more common in males than in females, and more frequently met with in country districts than in cities; and, strange to say, it is incomparably more frequent among Jews than Christians. In Nassau, in the year 1864, the proportion of deaf-mutes amongst the Jews was 1 to 508, whilst among the Catholics it was only 1 in 1,397, and among the Protestants 1 in 1,101; in the department of Cologne, in the year 1869, the proportion was—Jews, 1 in 560; Catholics, 1 in 1,814; and Protestants, 1 in 2,638.—“Kussmaul *Die Störungen der Sprache*,” s. 259, 262.

and dumb, but that dumbness is really due to the want of education of the faculty of speech, and not to its absence; for deaf children are quite as capable of articulation as those who can hear, provided they are not the subjects of any intellectual incapacity. As a proof of this, I may cite the remarkable progress lately made in the education of deaf-mutes, who are now taught to watch with the eye the motion of the tongue and of the lips of those who speak to them; and thus by imitating the inaudible mechanism of the lips and tongue of the speaking person, they are able to emit articulate sounds—in fact, to speak.

When the loss of hearing is dependent on congenital causes, a less amount of deafness will prevent the first development of speech than would be necessary to arrest it when once the faculty has been acquired; moreover, those who are born deaf and dumb are less susceptible of improvement than those who have become deaf in early childhood and have consequently lost the power of speech; these last, who should not strictly be called deaf-mutes, are much more amenable to treatment, and sometimes quickly recover what they had lost.

M. de Font-Reaulx has published the history of a deaf-mute, who died at Bicêtre at the age of sixty, and at whose autopsy there was found a remarkable atrophy of the island of Reil on both sides, especially on the left; the brain itself, however, was very large, with its convolutions particularly well developed, the entire encephalon weighing 1,620 grammes (57 ounces).* This observation is of extreme interest as contrasting with the microcephalic brains to which I shall allude hereafter.

* “Localisation de la faculté spéciale du Langage Articulé,” p. 99.

Dr. Llewelyn Thomas has recorded the case of a child who, after an attack of convulsions at the age of three years and a half, became dumb, and on examination the child was found to be also absolutely deaf.*

A striking illustration of the possible association of deafness with aphasia has been furnished by Mr. Glisson in the *British Medical Journal* for August 18th, 1875. The patient, a boy four years and a half old, was brought to Mr. Glisson for a skin affection, when his mother stated that at the age of eighteen months the child met with a fall, which resulted in a contusion of the skin and a small tumour in the left temporal region. Before the accident, he was just commencing to prattle a few simple monosyllables, but since he fell he had not been able to speak, and had scarcely ever tried. Now, it is not stated whether the boy was deaf, but as the injury was in the immediate neighbourhood of the temporo-sphenoidal convolution, it is highly probable that the auditory centre was damaged, or possibly some inflammatory process was set up in the internal ear itself.

The study of the muteness of the deaf is a subject well worthy of the careful investigation of those members of our profession who have the medical charge of institutions for the deaf and dumb, for it is now recognised that this infirmity is partly remediable; in fact, a noted French writer upon this subject says "il est possible de donner la parole à la plus grande partie des sourds-muets, car c'est le plus petit nombre, c'est l'exception qui présente des vices primordiaux ou acquis de l'appareil vocal."†

* *British Medical Journal*, Sept. 18th, 1875.

† "La Surdi-Mutité, par Dr. Blanchet, Chirurgien de l'Institut National des Sourds-Muets," tom. ii., p. 12.

2.—Aphasia is one of the frequent symptoms of idiocy and Esquirol actually based his classification of idiots upon the power of speech which they possess. In the first degree, the idiot, according to him, uses mere words and short phrases; idiots of the second class articulate only monosyllables or certain cries; finally, in the third degree of idiocy, there is neither speech nor phrases, neither words nor monosyllables. The case of G. van A., which I have quoted from Van der Kolk, may be considered as a good illustration of Esquirol's third variety. The subject of the loquelar defects in idiots is treated in a masterly manner by Dr. Wilbur, Superintendent of the New York State Asylum for Idiots, to whose interesting treatise I would refer for more complete information on this point.*

Dr. Kerlin, the Superintendent of the Pennsylvania Institution for Idiots, in a statistical table of one hundred idiot children, records 20 as aphasic; and of these 20 children, 2 were epileptic, 7 paretic, 9 choreic, 8 microcephalic or demi-microcephalic, and 3 hydrocephalic. Dr. Kerlin also gives the aggregates of orphanage, grade, condition, and parental and grandparental antecedents of these children.

It is important not to confound the aphasia of the confirmed idiot with ordinary deaf-mutism; for, as Duncan and Millard remark, the deaf and dumb children of uneducated parents, whose social position entails want and much misery, are often so low in their mental power that they cannot be distinguished from idiots before they attain the age of five or six years; and when they have the misfortune to have a halt in their gait, or an unusual

* "On Aphasia," New York, 1867.

ugliness of feature and awkwardness, they may puzzle the most experienced.*

A case of idiocy with congenital aphasia is reported by Dr. Shaw, of Haydock Lodge Asylum. The patient, who had never been known to utter any articulate sound, died at the age of twelve; and at the autopsy, besides other lesions, it was found that the posterior half of the second frontal and the greater part of the third frontal convolutions of the left hemisphere were destroyed by an enormous cyst containing fluid.

It is to be desired that those having charge of idiot asylums should seek opportunities of ascertaining by *post-mortem* examinations whether there be any congenital absence or atrophic condition of the particular cortical areas that are supposed to preside over the various bodily functions.

It has been said that intemperance in one or both parents, about the time of conception, may cause idiocy in their offspring;† if this be so, it is not unlikely that any morbid cerebral condition of the parents at the period of conception may give rise to aphasia in their children. A case confirmatory of this view has fallen

* "A Manual for the Classification, Training, and Education of the Idiot," p. 3. These writers, in describing the peculiarities of Idiocy, observe that "the voice is always more or less defective, and that perfect dumbness, ability to howl, cry, scream, and to sing without articulation, are commonly noticed. The voice is parrot-like in most instances, that is to say, the sounds bear no reference to a mental effort. Talking is rarely commenced by the idiot of any class; he must be spoken to, as a rule."

† The relation of alcoholic excesses in parents to the development of idiocy in their children, has been fully considered by me in my essay entitled, "The Idiot, and his Place in Creation." As this association is only indirectly connected with my present subject, I cannot dwell upon it here at any length.

under my own observation, the subject of it being a remarkably fine handsome boy, five years of age, but in whom the faculty of speech could not be roused into action, although he had been submitted to long and special training. Having noticed that he had a well-formed head, that there was no hereditary predisposition to cerebral disease, and that his brothers and sister were by no means backward children, I was induced to push my inquiries very closely in reference to the question of cause ; and I then elicited from the father that about ten months previous to the birth of this child, he had been thrown from his horse upon his forehead, that he was stunned by the fall, and that he felt confused in the head for some weeks afterwards. Without wishing to draw any positive conclusion from this case, it seems to me that I am not exceeding the bounds of legitimate inference, in connecting the shock to the nervous system of the father with the congenital defect in the son.

In reference to this subject, Dr. Gairdner has observed that the aphasic, supposing the disease congenital, could not possibly be educated, but must remain almost an idiot—the mind of an infant enclosed in the shell of a man ; he further remarks that in certain forms of cretinism, or of congenital idiocy, the primary defect may have been aphasia, and thus the development of the mental faculties an impossibility.*

Dr. Bastian, in a chapter on Disorders of Intellectual Expression by Speech, says that there are cases allied to congenital idiocy in which, owing to some intra-cranial lesion occurring either before, during, or soon after birth, the child's mental condition is greatly degraded, as well

* Gairdner. "On the Function of Articulate Speech," p. 32.

as his motor power. In some of the less severe examples of this type, speech is merely deferred—perhaps till the fourth, fifth, or even the sixth year—and may after a time become established in a natural manner.*

A case came under my own personal observation some years ago of this tardy development of the faculty of speech. The child never spoke at all till he was six years old, and it was thought he would remain dumb. At six years of age he began to talk, and was able to receive an education suitable to his condition in life, but he grew up to manhood a person of feeble intellectual and also of feeble physical power.

3.—Aphasia has frequently been observed as a symptom of exostosis, or of malformation of the bones of the cranium :† of sanguineous deposits in the brain : of thrombosis or spontaneous deposit of fibrine in the minute arteries of the convolutions—in this case the loss of speech is often only temporary, the influence of the collateral circulation being sufficient to counteract the effects of the circulatory disturbance. M. Proust cites the case of a lady with atheromatous arteries, who, at irregular intervals had aphasia more or less complete, accompanied by tingling and paresis of the right limbs. M. Proust attributes these symptoms to minute thromboses in the diseased cerebral arteries, which disappeared as soon as the collateral circulation was established :‡

* Bastian. "Paralyses Cerebral, Bulbar, and Spinal," p. 99.

† Dr. Magnan, at the Biological Society of Paris, described a case of aphasia, with right hemiplegia, in which the post-mortem examination disclosed osteitis of the left parietal bone, which was supposed to be syphilitic. The site of the diseased portions of the bone corresponded with that of the ascending portion of the third frontal convolution.

‡ "De l'Aphasie par Adrien Proust," p. 46.

of ischæmic softening consequent on sudden embolic plugging of the arterial channels which convey the blood supply, by which the functional activity of the part is temporarily or permanently suspended, and the nutrition of the cerebral cells arrested—of all the organic diseases of the brain this is perhaps the most common cause of aphasia: of tumours in different parts of the encephalon, although, from the observations of Ladame, Krishaber, and others, they are not a very frequent cause of speech disturbance, possibly from the fact that by their slow development they merely compress and displace the nervous structures without destroying them. In the "*Rivista Sperimentale di Freniatria*" for 1883, Tamburini and Marchi have reported a case of aphasia and right hemiplegia caused by a glioma involving the frontal convolutions of the left hemisphere.* Loss of speech may also occur as a symptom of encephalitis, abscess, tubercles, hydatids;† and, in fact, of organic lesions of various kinds affecting the cerebral substance, especially the anterior lobes.

At the moment of writing this section my attention has been called to the remarkable essay on the Surgery of the Brain and Spinal Cord, read by Dr. Macewen at the recent meeting of the British Medical Association at Glasgow. In this valuable contribution to our know-

* "*Contributo allo studio delle Localizzazioni Cerebrali e dei Gliomi Cerebrali.*" This case, which is reported in minute detail, both as to its clinical history and the histological characters of the tumour, formed the subject of a most elaborate article on cerebral localisation by Tamburini and Marchi.

† Dr. Yellowly has reported a case of hydatid in the right hemisphere, with left hemiplegia and impairment of speech.—"*Medico-Chirurgical Transactions*," vol. ii., p. 262.

ledge of cerebral disease, the author mentions a case of abscess of the brain, the clinical history of which may truly be said to be unique in the annals of Brain Surgery.

A cicatrix on the forehead marked the site of an injury, under which the skull was bare ; had this cicatrix been taken as a guide to the localisation of the abscess, and an operation had been performed there, no abscess would have been found ; but other phenomena were exhibited, which enabled its seat to be definitely recognised. A convulsion, accompanied by loss of consciousness, commenced on the right side, and gradually involved the whole body ; on its cessation, absolute hemiplegia of the right side was present, and remained for two hours, during which time the patient was aphasic. Both these phenomena became much less marked at the end of this period ; from these symptoms the abscess was diagnosed to be situated in the immediate vicinity of Broca's lobe.

Trusting to these localising symptoms, it was proposed to open the abscess aseptically by exposing Broca's lobe. Unfortunately, the result of a consultation was decidedly to negative this proposal. The parents then refused consent, notwithstanding the assumption by Dr. Macewen of the sole responsibility of advising and performing the operation. Thirty-six hours afterwards the convulsions returned, and persisted until a fatal issue ensued.

After death the friends acquiesced in the proposal to have the operation performed, just as it would have been, had permission to do so been granted during life. The skull was trephined, the brain exposed, and an instrument was introduced through the third frontal convolution for half an inch, when pus flowed through the

incision, proving the accuracy of the diagnosis, and giving poignancy to the regret that the operation had not been performed during life. The abscess, about the size of a pigeon's egg, was situated in the white matter of the basis of the second and third frontal convolutions.

In commenting upon the above unique case, Dr. Macewen says that the precise spot which the abscess occupied was accurately determined from the localising phenomena induced by the focal lesion, which were trusted as indicating its position, though pointing to a different part of the brain from that which would have been selected had the seat of injury been accepted as a guide. The operation showed how easily the pus could have been evacuated, though the unfortunate refusal to allow it to take place during life, leaves uncertain the ultimate issue, but, judging from subsequent experience, worse cases have recovered after operation.*

It would seem that disease in the neighbourhood of the anterior lobes, but sufficiently near to exercise indirect pressure upon them, may give rise to aphasia. Dr. A. Voisin has recorded a case where it was caused by the pressure exercised on the left anterior lobe by a considerable hæmorrhagic clot in the temporo-sphenoidal lobe on the same side.†

Dr. Oedmansson, of Stockholm, mentions a case of tubercles in the brain, in which aphasia was a symptom during life; after death there was found hæmorrhage into the left insula.‡

* *British Medical Journal*, August 11th, 1888, p. 303.

† "Nouveau Dictionnaire de Médecine et de Chirurgie Pratique, Article Aphasie."

‡ *Dublin Quarterly Journal*, Nov., 1868. Translated from the *Hygiea*, by Dr. W. D. Moore. This is a short review of the aphasic question by a

Huguenin, in his article on meningitis tuberculosa, says that some cases begin with aphasia, which are highly interesting on various grounds. He illustrates his remarks by several cases given in detail, from which I have selected the following, which he quotes from Traube:—

Man, thirty-four years old ; hereditary predisposition to phthisis ; the affection of the brain begins with chills ; severe headache ; the pupils, and, generally, the motility normal at the beginning.

December 8th.—Restlessness ; congestive redness on the head ; *in the evening, suddenly, aphasia* ; incorrect naming of objects ; great restlessness and excitement caused by this ; consciousness entirely clear.

December 9th.—Speech quite unintelligible ; restlessness ; slight signs of right facial paralysis ; convulsive movements in the extremities.

December 10th.—Somnolence ; aphasia still exists ; attack of convulsions. The rest of the course of the disease was remarkable for its severe convulsions.

Autopsy.—Old tuberculosis of the lungs ; spleen, kidneys, liver, show miliary tubercles ; pia mater much thickened in the convexity, still more so at the base, especially at the chiasma, and most of all in the left fissure of Sylvius ; abundance of small miliary knots ; hydrocephalus ; choroid plexus showing tubercles.

In all the observations quoted by Huguenin the aphasia was *sudden*, and he says that a suddenly occurring aphasic lesion may be used to diagnosticate miliary tuberculosis of the pia mater, and he further adds that in all cases of aphasia we must think of tuberculous meningitis as one possible cause.*

Swedish physician, together with some original cases of great interest ; the author, however, seems but imperfectly acquainted with the contributions of British authors.

* Huguenin. "Acute and Chronic Inflammations of the Brain and its Membranes." Ziemssen's Cyclopedia, Vol. xii., p. 543.

Gowers, in speaking of loss of speech in certain cases of tuberculous meningitis, says that it is probably a consequence of irritative inhibition, and he adds that the speech centre seems specially susceptible of inhibition.*

Instances of loss or impairment of speech dependent upon most of the causes mentioned in this section, have been recorded in the previous pages of this work.

4.—It may occur as a consequence of direct injury to the brain; of this cause several instances have been given in the preceding pages (Lesur, Castagnon, Romberg, Bergmann, Kolk, H. Jackson). Traumatic cases may be regarded as veritable vivisections, and their study is invaluable in an etiological point of view, as contributing, perhaps more than any other class of cases, to sound ideas as to the question of the cerebral localisation of our divers faculties.

Napoleon's great surgeon, Baron Dominic J. Larrey, in his *Clinique Chirurgicale*, has carefully recorded several cases of traumatic lesion of the brain, from which he has drawn conclusions which are to a great extent confirmatory of our modern theories of localisation. One of the most interesting of this collection is the following:—

On November 12th, 1821, a man named Blanc received a thrust from a fencing foil, the button of which had become detached, the unprotected end of the foil striking him behind the external angular process of the left side of the cranium. He immediately fell down, and on getting up, it was found that he was deprived of speech, sight, and hearing, there being at the same time some signs of mental aberration. Considerable benefit ensued from bleeding, but a few days afterwards there was a relapse, and it was noticed that

* "Diseases of the Nervous System," Vol. ii., p. 115.

the patient no longer pronounced substantives or proper names. It was not the recollection of this class of words that he had lost, but the power of articulating them; for if he was asked his name, he would show his bed-ticket, and point to his name inscribed upon it. Not being able to mention an object by name, he would employ a paraphrase having a more or less intimate relation to the object that he wished to describe. Eventually the above defect became intermittent, and ultimately completely disappeared under the use of moxas.*

The following curious case, quoted by Dr. Popham, of Cork, is not only interesting from its traumatic cause, but from the local morbid condition which coincided with recovery:—

A boy, aged 15, received a kick from a cow, between the nose and the forehead, which stunned him, but left apparently at the time, no other injury than a few scratches and slight epistaxis, so that he walked after it some miles to a fair. On the fourth day he was seized whilst at work with vertigo and loss of speech, his hearing, taste, and sight, as well as deglutition, remaining unaffected. A variety of remedies, amongst others

* Since the publication of my first edition, my attention has been called by an eminent Parisian military surgeon to an interesting monograph on Traumatic Dysphasia, by Dr. A. Martin. It contains a succinct account of the elder Larrey's extensive experience of the psychical results of gun-shot wounds of the brain, and is well worthy of the careful perusal of those interested in this field of research. M. Martin's treatise also contains the surgical experience of Larrey's son, M. le Baron Hippolyte Larrey, Membre de L'Institut, to whom I am much indebted for great personal courtesy to myself.

From a careful study of the clinical facts furnished by the vast experience in military surgery of the two Larreys, father and son, M. Martin arrives at the conclusion that traumatic aphasia is a very frequent, if not a constant, result of wounds of the antero-lateral portion of the left side of the head, whilst it is only very exceptionally observed in connection with lesions of the right anterior lobe.

mesmerism, were tried, but without any benefit. He continued for twelve months as servant to a medical man, although totally mute, when he got extensive inflammation of the anterior part of the scalp followed by suppuration, and regained his speech as suddenly as he had lost it eighteen or nineteen months before.*

Dr. Th. Simon, of Hamburg, in an elaborate essay on the theory of aphasia, has recorded a typical case, illustrative of the cause of the loss of the faculty of articulate language.

A perfectly healthy man, twenty-three years of age, fell from his horse when riding with several companions, one of whom was a physician. He got up immediately, seized the bridle, and was about to re-mount, when his medical companion approached, and, after examination, discovered a small wound on the left side of the head, with depression of the bone. He was totally unable to speak, but could make himself perfectly understood by signs. There was no motor paralysis of any kind.

On his being removed to his own house, a more minute examination was made, and the precise nature of the accident was ascertained. In the left parietal region, a little above the planum semicirculare, was a wound of the size of a two groschen-piece (Zweigroschenstück), in the bottom of which could be felt a piece of depressed bone.

Omitting the daily progress of the case, it is sufficient to say that death ensued at the end of three weeks from purulent meningitis and inflammatory softening.

Autopsy.—The *post-mortem* appearances are given in great detail. In the left parietal region there was found a round hole three-quarters of an inch in circumference, as if made by a bullet; at the bottom of this hole was found a piece of detached bone denuded of periosteum, from the inner table of which a spiculum had become separated and was embedded in the third frontal convolution, which, as also the adjacent portions of the second and of the island of Reil, were softened.

* Popham op. cit., p. 9.

It is impossible to exaggerate the scientific importance of this carefully detailed observation. It was evidently considered by Simon as an *experimentum crucis*, for in commenting upon the inference to be deduced from it, he says that the fact of a traumatic lesion of the third left frontal convolution in a previously perfectly healthy man, resulting in complete aphasia, compels him to range himself with those who would localise aphasia in that particular fold of the brain.*

There is one point in the treatment of this patient that I must venture to criticise. Simon tells us that the question of trephining was raised, and that after consultation, the proposition was negatived. This decision is scarcely in accordance with our modern ideas of Brain Surgery, and I must think that the operators of the present day would not have allowed this man to die without attempting some surgical means for his relief. Of course, it must be admitted that at the time this patient was under observation, the profession was scarcely in a position to judge adequately of the value of operative interference; recent experiments, however, in Brain Surgery, especially those of Macewen, Godlee, and Horsley, have placed this question beyond dispute, and the earlier trephining is performed in such cases, the greater the chance of ultimate success.

The annals of medical literature of the last quarter of a century abound with cases of traumatic aphasia, from which I select the following:—

A farmer, in a dispute with his brother-in-law, was knocked down by a blow on the head with an iron bar; he immediately got

* Casuistische Beiträge zur Lehre von der Aphasie, von Dr. Th. Simon. Berliner klinische Wochenschrift, 1871, s. 599.

up, complaining bitterly of the gross assault of which he had been the victim. He was able to walk home, and for some time was able to articulate distinctly several words; he was soon, however, entirely deprived of the power of speech, and some slight right hemiplegia manifested itself. Behind the left fronto-parietal suture could just be distinguished a slight superficial contused wound, one or two centimètres in length, and quite superficial.

Although unable to speak, he understood all that was said to him; he put out his tongue when asked, and looked straight at the person who addressed him. He seemed progressing fairly well till the third day, when symptoms of secondary inflammation set in, and he died on the fourth day after the receipt of the injury.

A medico-legal autopsy was made, when the following morbid condition was disclosed. Slight infiltration of blood beneath the contused wound; fracture of the anterior and inferior portion of the left parietal bone, extending to the posterior border of the frontal and to the great wing of the sphenoid; between the dura mater and the bone was a clot of blood, caused by a rupture of a branch of the middle meningeal artery, which, from its position, pressed upon the anterior lobe of the brain at the point corresponding to the third left frontal convolution.*

Professor Ball has recorded the case of a merchant who went to reside in a town in Central America. He there took into his service a negress of gigantic stature, herculean strength, and of a very violent temper. One day, having occasion to remonstrate with her, she gave him a severe blow on the head with her fist. He fell down unconscious, and, on reviving, he was completely aphasic, but not paralysed. The aphasia was of short duration, but he fell into a state of intellectual torpor.†

I could multiply *ad infinitum* the record of cases of loss of speech as the result of direct injury to the brain, but I will only mention three cases of traumatic aphasia that have fallen under my own observation.

* Malichecq. "Gazette des Hôpitaux," 1865, p. 322.

† "L' Encéphale," No. 3, 1881, p. 374.

In November, 1882, I was requested by Dr. Mills, the police surgeon of Norwich, to see with him a man, aged 36, who had been struck on the head with a brush just above the left ear. When seen by Dr. Mills a few hours afterwards, he found a bruise about two inches above the left ear, and of the size and shape of a hen's egg; the right arm and leg were paralysed, also the organs of speech. His intelligence was clear, but he was unable to say more than "Yes" or "No," and one or two other single words, such as "ear" and "wife." At my visit nine days after the accident, I found complete paralysis of the right arm, but he could move the leg tolerably well in bed; there was still aphasia, as he could not make himself understood, being only able to say a few isolated words.

The second case I had an opportunity of seeing in the Norfolk and Norwich Hospital, under the care of my surgical colleague, Mr. Crosse. The subject of it was a young lady, aged 31, who was knocked down by an empty box which struck her forcibly on the left temple, the accident having been caused by a horse running away with a cart; the vehicle coming in contact with some obstacle in the street, the box fell out and struck Miss N., as above stated, on the left side of the head, knocking her down, and causing the right side of the head to come in contact with the curb-stone; she was taken to the hospital in a state of complete unconsciousness.

On examination a large bruise was observed over the left temple, and some swelling of the left eyelid; the surface was cold, pulse feeble, pupils normal, some blood oozing from a wound at the back of the right ear, but none from either meatus; there was no evidence of motor-paralysis, or of any injury to limbs.

This patient remained quite unconscious for eight days, when she sat up in bed and looked about her, but did not speak. Without going into daily details, I will merely add that at the end of the second week, some loss of motor power on the right side began to manifest itself; she slowly and gradually regained her speech, but on her recovery, it was noticed that she had entirely lost all remembrance of events immediately preceding the accident, being quite unable to recall what she did on the morning when it occurred, or even where she had been on that day.*

* Dr. Bell, of Edinburgh, has published a number of cases of severe concussion and cranial injury, in which the patients had no recollection of

The third case was that of a man admitted into the Norfolk and Norwich Hospital under the care of my colleague, Mr. Williams, who, knowing the interest I took in such cases, kindly asked me to see the patient, who was a gardener, aged 30, who, in a quarrel, was struck with the crome of a walking-stick over the left temple. He was knocked down by the blow, but was able to get up immediately, when he found he was unable to speak. There was no motor paralysis of any kind; in fact he walked home, a distance of half a mile, and actually helped a friend to yoke a horse to a cart that was to convey him to the hospital; for, although speechless, he intimated by signs his wish to be taken to that institution.

On being conveyed to the hospital, he walked into the ward, was quite unable to speak, but intimated by signs that he did not wish to be undressed. On examination, a distinct indentation admitting the tip of the finger was observed about an inch and threequarters above the left ear. For a period of eight hours he was quite speechless, but at the end of that time he began to say a word or two, and after a few days the aphasia passed off.

It will be observed that in all the three above-mentioned cases, the loss of speech was caused by direct violence applied to the left temple; in fact, to that part of the cranium corresponding to the supposed centre for speech; but in Mr. Crosse's case, there was such prolonged intellectual torpor, that it may be assimilated to that of M. Ball, which I have quoted in this section, and which the learned French professor characterised as one of cerebral torpor.

the events which happened within a limited space of time immediately before the accident; this loss of a small section of memory coinciding with perfect power of recollecting all more distant facts, and with unimpaired memory and mental power after recovery. Amongst others, he mentioned the case of a miner suffering from severe cranial fracture, who utterly forgot the Saturday and Sunday preceding the morning of the accident. This curious lacuna in the memory of events has an analogy to the cases where a similar defect exists in the power of recalling any particular language.

The annals of military surgery are rich in instances of traumatic aphasia, the result of gunshot wounds of the head, but the impairment of language is only mentioned as it were *en passant*; now, however, that the attention of the profession is being called to the localisation of the cerebral faculties, it is to be hoped that a more detailed account of the psychological phenomena attendant on gunshot wounds of the head will in future be given, and that "*Surgery Militant*" will thus make its vast resources more available for the settlement of complex and obscure questions in cerebral pathology.

5.—It may occur as a remote symptom of endopericarditis, where fibrinous vegetations detached from the cardiac valves have been carried into the cerebral arteries (usually the middle cerebral)* and have thus caused embolism; thus establishing a relationship between cardiac disease, obliteration of the middle cerebral artery, softening of the brain from loss of nutrition, and aphasia. As illustrating the above sequence of symptoms, I would refer to the history of William Lemon among my own observations, and to the cases of M. Peter and Dr. Scoresby Jackson, also mentioned in the preceding pages.

The coincidence of cardiac disease with aphasia is most common; it will be remembered that of the thirty-four cases recorded by Dr. Hughlings Jackson in the London Hospital Reports, the heart was more or less affected in twenty instances.

Dr. Cesare Lombroso, of Pavia, in commenting upon the cases of Dr. Jackson, denies the construction usually

* We may assume that these vegetations are more likely to pass up the *left* carotid.

placed on the coincidence of aphasia and disease of the heart and large arteries; according to him, the disease in the nervous centres would be the *cause* rather than the *consequence* of the affection of the heart and arteries, the disease in these last depending upon perverted organic nutrition, the result of faulty innervation. Dr. Lombroso further remarks that although there may be cases in which cardiac hypertrophy may determine disorders of the nervous centres, yet, as a rule, these lesions in the circulating organs are secondary and not primary.* Although the high scientific position of the distinguished Italian professor naturally claims for any statement of his the greatest possible respect, I apprehend that his views of the sequence of heart and head affections will not be unreservedly adopted by English pathologists.

Impairment of speech may also be caused by various disturbances of the cerebral circulation, including congestion from general plethora, increased cardiac action, venous obstruction, or vaso-motor paralysis of the cerebral vessels. Here I would observe that the role of the sympathetic system in the causation of speech disturbance has not been sufficiently estimated, although from the valuable researches of Claude Bernard, Brown-Séquard, Schiff, and others, we can no longer doubt of its functional importance; in fact, the brilliant experiments of these physiologists have thrown a flood of light on the diagnosis of cerebral diseases, the pathogeny of which had hitherto been wrapped in obscurity.

Disorders of the ganglionic system of nerves, by inducing local vascular hypersthenia or hyposthenia, may give rise to hyperæmia or anæmia, of which conditions aphasia may be the result.

* "Studi Clinici sulle Malattie Mentali," p. 9.

6.—It has been observed as a symptom of disease of the spinal cord (Maty, Abercrombie, &c.); Velpeau, in the "*Revue Médicale*" for 1826, has recorded a case of left hemiplegia with aphasia, where after death he found in the centre of the right column of the spinal cord, and in the middle of the cervical portion, a cavity three inches long and two or three lines in diameter, full of soft matter like pus; in the left column of the same portion of the cord, there was a similar disease, but to a less extent; the brain was healthy.*

As I am treating of Disturbances of Speech in general, those connected with spinal disorders must form the subject of brief allusion, although it is clear there is no psychical or intellectual factor in their production, and they may be considered as simply affections of articulation (anarthria).

7.—Aphasia may be due to functional disturbance of the brain as well as to organic disease of that organ, and may appear as a symptom of various purely functional disorders; in fact, whatever interrupts the processes of ideation and thought, such as fright, alarm, or emotional shocks, may cause inability to speak. It may ensue as a nervous symptom; thus many persons under the influence of anger, joy, or excitement of any kind, are seized with a temporary incapacity to speak.

Instances of suspension of the power of utterance from great mental emotion, are of daily occurrence, and the great writers of antiquity, who seem to have been such close observers of nature, have not failed to show their knowledge of the psychological results of any sudden

* Abercrombie. "*Diseases of the Brain and the Spinal Cord*," p. 357.

and unexpected shock upon the nervous system. Everybody is familiar with the lines of Virgil in which he makes Æneas describe the psychical effect produced upon him by the appearance of the ghost of Creusa :—

“Obstupui, steteruntque comæ; vox faucibus hæsit.”

Dr. Todd, under the head of emotional paralysis, mentions the case of a man between fifty and sixty years of age, of an irritable temperament and hypochondriacal habits, who, in a very animated conversation, became excited to such a degree that his power of speech completely abandoned him; there was no paralysis, and the mental faculties were unaffected; he continued speechless, however, for about a week, and in a short time the power of speech fully returned.* Mr. Dunn mentions an instance of aphasia occurring during the latter months of pregnancy, after a sudden and painful shock.†

In the report on military prisons by Captain Du Cane, it is stated that a prisoner being checked at drill by one of the warders, said he wished “that God Almighty would strike the warder dumb;” whereupon the prisoner himself was struck dumb on the spot, and did not recover his speech for seven days.‡

Dr. Panthel, of Limburg, has furnished the following curious illustration of the effect of nervous excitement upon the power of speech :—

A peasant boy, twelve years of age, previously in good health, was very much affected at the grave of his father, whom he had unexpectedly lost. During the interment he threw himself down, and was carried home unconscious. The fainting lasted about a

* “Clinical Lectures on Diseases of the Brain,” p. 278.

† “Medical Psychology,” p. 77.

‡ *Medical Times*, Oct. 23rd, 1869.

quarter of an hour, when he awoke in the undisturbed possession of all his faculties, sensory and motor, except that he was unable to produce any sound. Dr. Panthel having been summoned, noticed that the intellect was unaffected, that he suffered no pain or uneasiness—as indicated by the motion of the head—but that he had lost his speech and voice, and could utter no sound whatever. He could move the tongue and lips in all possible directions, and the functions of deglutition and respiration were unaffected. On being questioned and urged to speak, he seemed confused, and by a shake of the head expressed his inability. If he attempted to speak, violent spasms were produced in the muscles of the larynx, governed by the hypoglossal nerve—the sterno-thyroid, hyo-thyroid, and sterno-hyoid. On Dr. Panthel's compressing these parts with the hand, the cramp immediately ceased, and in answer to the question whether he could speak, he instantly replied, with cheerful countenance, "Yes, speech is my greatest delight!" When the pressure was removed, the inability to speak recurred; the power of utterance being instantly restored by again applying the hand to the supra-laryngeal region. This singular condition lasted three days, when he was again in undisturbed possession of speech. A fortnight afterwards, being in a field, a brace of partridges suddenly flew past him, when the speech defect above described returned for two days. A week later, in consequence of some strong mental emotion, another relapse ensued, which lasted only a few hours. After this no fresh attack occurred, and the lad continued perfectly healthy.*

Mr. de Berdt Hovell, who considers this class of case as the result of nerve shock, has proposed the word *Neurokinesis* as a suitable term to express the condition of the nervous system which ensues upon shock, either physical or moral, and in an interesting essay on *Emotional Aphasia* he has recorded the following typical illustration of his views:—

I was called at midnight to see a lad, aged sixteen, who had lost the power of speech. He was rather excited, pulse quick, &c., but

* "Deutsche Klinik." Jahrgang, 1855. S. 451.

had no other presentable symptom other than that, like Zachariah, "he was dumb and unable to speak," and made signs that he wanted writing material, by means of which he expressed himself correctly, and gave pertinent answers to questions asked. He recovered his speech in twenty-four hours, and rested for a week ; but, notwithstanding caution and advice not to over-exert himself, the same condition of aphasia returned about six weeks after, and continued forty-eight hours, when he again recovered, and was apparently well. About two months afterwards a third attack occurred, apparently from excitement on seeing a boat-race, in which, being much interested, he ran and shouted along the bank for some time and distance. From this, the third attack, he did not recover so readily, and, in accordance with the wishes of his friends, I procured his admission into an hospital, where he underwent various examinations, but after the lapse of five days he recovered his speech under the influence of galvanism.

Under this head may be classed the disturbances of speech so common in chorea ; here, of course, the defect is not psychical, but the result of choreic disturbance of the functions of the muscles of articulation.

8.—The epileptic condition seems to be a frequent cause of aphasia. Leborgne, Broca's patient, was an epileptic, as were also the subjects of several of the cases I have recorded, and the term *epileptic aphemia* has been applied to them. M. Delasiauve has recorded the case of an epileptic woman, in whom aphasia alternated with epilepsy—thus, she would be aphasic for a week, when, on the occurrence of a fit of epilepsy, the power of speech would return, paralysis of the bladder, however, ensuing ; by and by she would again lose her speech, and the same sequence of symptoms would ensue.

A curious instance of the coincidence of aphasia with epilepsy is recorded by Dr. Oedmansson, where the epilepsy occurred after a blow on the vertex ; the aphasia

was transient, but frequent; on every occasion that several attacks occurred soon after one another, the power of speech suffered in a greater or less degree, and was gradually completely lost. When the attacks ceased or became less frequent, the power of expression soon returned; at the same time, both intellectual disturbances and occasionally also paralytic phenomena set in and disappeared, but the aphasia always preceded them, and was the last to cease.*

9.—Loss of speech has frequently been observed associated with neuralgia. At the meeting of the Société Médicale des Hôpitaux, at Paris, April 12th, 1867, three cases of loss of speech were mentioned as a symptom or accompaniment of facial neuralgia. The subject of one of them (that mentioned by M. Guyot), was a lady aged thirty-four, who for fourteen years had suffered from facial neuralgia, and who was suddenly seized with aphasia, which lasted half an hour and then ceased; the loss of speech recurred under similar circumstances, when both it and the neuralgia were removed by sulphate of quinine.

10.—Reflex action. Dr. Brown-Séquard, in his course of lectures delivered before the New York Academy of Medicine, expressed the opinion that aphasia was a reflex phenomenon, and that he had seen cases due to peripheral irritation, and in which no brain lesion could be discovered after death.

Sauvages, under the name of *Mutitas Verminosa*, mentions the case of a child in whom loss of speech was

* Oedmansson, op. cit., p. 493.

due to the presence of worms; anthelmintics having been administered, thirty-six lumbrici were expelled, when speech was restored, with the exception of a difficulty in pronouncing the letter B.*

Hoffmann also mentions a similar case, where the cerebral irritation from reflex action was more permanent and accompanied by opisthotonos. The occurrence of the aphasia was sudden, but although the administration of anthelmintics soon resulted in the expulsion of fifteen worms, it was only after an appropriate treatment of many weeks that the power of speech began to improve.† The same author says elsewhere, that he has frequently seen and cured cases of loss of speech from the presence of worms.

Dr. Gibson, of Hull, has also recorded a case of aphasia with complete paralysis of the extremities, caused by *Trichocephalus dispar*, and cured in twelve days by appropriate treatment.‡

An American writer, Dr. Shaw, has stated that there is a direct communication between difficulties of speech and exaggerated tendon-reflex. Dr. Spitzka, on the other hand, maintains that clinical observation does not bear out Dr. Shaw's conclusions. Thus, in eight instances in which the knee-jerk was exaggerated, speech was only once markedly affected, whereas on two occasions in which reflex was abolished, speech was much affected.§

II.—Several instances are on record in which loss of speech supervened on atmospheric changes, or on appli-

* "Nosologia Methodica," tom. i., p. 779.

† "Hoffmanni Opera," tom. iii., cap. vii., obs. iii.

‡ *Lancet*, Aug. 9th, 1862.

§ *American Journal of Neurology and Psychology*, August, 1883.

cation of cold or heat to the head. In the case I have quoted from Dr. Jackson, of Pennsylvania, the aphasia occurred after a check to the cutaneous perspiration from exposure to the night air ; Dr. Banks records an instance of aphasia and deafness occurring after fatigue on a *very cold day* ; and Abercrombie mentions a case of a young man who bathed twice in the river Tweed, and who after coming out the second time lay down on the bank and fell asleep without his hat, exposed to the intense heat of the sun. On awaking he was *speechless*, but walked home, and seemed to be otherwise in good health.*

Many years ago an invalid soldier came under my own observation, who five months previously, whilst at Corfu, had a *sunstroke*, which caused left hemiplegia and *loss of speech for a week*. This case is of some interest, not only from the paralysis being on the *left* side, but also from my having made a note of it long before I could have had any preconceived ideas about modern localisation theories.

Loss or disturbance of speech may also be caused by cerebral vibration without visible lesion, by simple molecular disturbance of the brain cells, as exemplified in a form of cerebral disturbance described by Dr. Franks-Smith under the name of Hephæstic Hemiplegia, or Hammer Palsy, as it occurs amongst the artisans of Sheffield. In many of these observations, aphasia was a prominent symptom, and the patients were exposed to none of the causes of cerebral lesion with the exception of the continual use of the seven-pound single-handed hammer. In every instance complete or partial recovery followed the use of phosphorus, iron, strychnia, and cod-

* Abercrombie, op. cit. p. 155.

liver oil, with absolute rest and prolonged absence from the forge.*

12.—Certain drugs, especially those obtained from the Natural Order Atropacæ, would seem in some instances to suspend the power of speech. Sauvages, under the head of *Mutitas a narcoticis*, says that certain robbers which infested the neighbourhood of Montpellier, in order the more successfully to exercise their profession, were in the habit of drugging wine with the seeds of the *Datura Stramonium*, the effect of which was, that those who drank it could not speak for one or two days, although wide awake. He also states that he has observed the same effect from the berries of the *Atropa Belladonna*, and from the roots of *Hyoscyamus Niger*. This shrewd observer has not omitted to speak of that want of control over speech produced by alcohol "*idem accidit cum temulentia imò a vini abusu balbuties orta quotidie observatur.*"†

In a well-marked case of poisoning by *Belladonna* observed by Mr. Nicholas Grattan, of Cork, aphasia was a prominent symptom. A lady, aged 42, drank by mistake two ounces and two drachms of *Belladonna Liniment* (P.B.). She was treated by the subcutaneous injection of one-fifth of a grain of pilocarpine every fifteen minutes; after the fourth dose speech was restored.‡

Dr. Paget Blake, of Torquay, has also published a case of poisoning by *Stramonium* ($1\frac{1}{2}$ drachm of the tincture), in which the patient on recovering his speech—which he had at first entirely lost—misnamed almost everything

* *Lancet*, March 27th, 1869, p. 427.

† "*Nosologia Methodica*," tom. i., p. 177.

‡ *Lancet* 1881.

he wanted, although he was evidently quite unaware that he did so ; several days elapsed ere he could mention his wants without calling something by a wrong name.* It will be observed that the aphasia, which was *atactic* at first, before passing off assumed the *amnesic* form.

A very curious case was read at the Leeds Medico-Chirurgical Society by Dr. Ginders, of Normanton, in which aphasia was attributed to the excessive use of tobacco. The patient, a female aged fifty-eight, had been a great smoker for fifteen years, and during the last four years of that period she is said to have consumed weekly six ounces of common shag tobacco, which she smoked in a short black pipe !

Dr. Popham, of Cork, has noticed the occurrence of temporary dumbness in a boy who had eaten the roots of "*Ceanothe Crocata*," which he had mistaken for field carrots.†

Dr. Nichols, of Chelmsford, has seen aphasia produced by the administration of *Cannabis Indica* ; and Dr. John Ogle has recorded a case in which opium given in small doses always caused the patient to be talkative, "to talk foolishly," as she called things by their wrong names ; the peculiarity passed off when the effects of the drug ceased. There was no symptom whatever of any cerebral disease, and Dr. Ogle presumes that the effect of the opium was the result of some peculiar modification of the cellular or vascular action within the brain.‡

* St. George's Hospital Reports, 1868, p. 159, where minute details of this interesting case are given.

† *Dublin Quarterly Journal of Medical Science*, Nov., 1865, p. 484.

‡ *Lancet*, Aug. 22nd, 1868.

13.—Septicæmia. Blood poisoning—whether from uræmia, as in Bright's disease, or from alcoholism, gout, plumbism, or syphilis—is another frequent cause, illustrations having been furnished by Andral, Jaccoud, Heymann, and Auguste Voisin. The case of Anna Maria Moore, reported by myself, may be considered as due to blood poisoning, for a diseased action which is set down as the result of the climacteric change, may be due to the retention in the system of certain morbid and effete matters—some irritating compound in the blood—which ought to be eliminated by the kidneys, and thus a septicæmic condition is produced.

Hoffmann mentions the case of a girl of eighteen, who, on exposure to cold during a journey at the period of menstruation, was seized with symptoms of cerebral congestion, and was dumb for four days, the mind and senses remaining unaffected; after an evacuant and diaphoretic treatment she entirely recovered.*

The suspension, more or less complete, of the power of speech which sometimes occurs after continued fever, is probably due to a vitiated condition of the blood circulating through the brain. It occurs more frequently after enteric than typhus fever; Dr. S. Jackson, however, mentions three cases in which typhus coincided with impaired speech;† Dr. Osborne has recorded three instances of gastro-enteric fever, in which loss of speech occurred without disturbance of the intellect; and Trousseau mentions three cases, one observed by himself, and two by M. Boucher, of Dijon, in which aphasia occurred during *convalescence* from fever (dothinerteric); in two of these cases there was albumen in the urine.‡

* Op. citato. tom. iii., cap. vii., obs. i.

† *Edinburgh Medical Journal*, January, 1847.

‡ "Clinique Médicale," tom. iii., p. 618.

My friend, Dr. Anatole Manouvriez, of Valenciennes, has kindly sent me the clinical history of a child, aged four, who at the end of the second week of an attack of typhoid fever, suddenly lost her speech, without any intellectual, sensitive, or motor trouble ; the aphasia was complete for seventeen days, then gradually subsided, and at the end of five weeks the power of speech was regained.*

At a meeting of the Philadelphia Neurological Society, Dr. Ott mentioned the following instance of aphasia occurring after measles :—

A boy twenty-eight months old was doing well up to the tenth day, when he seemed nearly convalescent, but instead of the dull yellowish stains which remain after the papules of measles have faded, his skin was dotted over with spots of a purplish hue. The same morning his mother noticed a twitching of the muscles of the right eye and right side of the face, and soon after similar movements of the right arm and leg. He remained conscious during the spasm, but was unable to speak, motioning for anything he wanted. After the spasm had existed an hour, complete right hemiplegia ensued, with complete aphasia. Here then was a little boy, who talked connectedly and as well as usual for his age, suddenly stricken with unilateral spasm, followed by hemiplegia and total loss of the power of speech, his intelligence remaining perfect. In the fifth week he used a few monosyllables, and later on simple words were added to his vocabulary, his mother remarking that it seemed as if he had to learn to talk over again. At the sixth month, although talking more, he only used such familiar words as children learning to speak usually employ.†

Aphasia has also been observed in variola, scarlatina, and erysipelas ; Trousseau has also observed it in a case of diabetes.

* A full account of this interesting observation is contained in the "Gazette des Hôpitaux" for March 17th, 1877, under the title of "Aphasie dans la fièvre typhoïde chez les enfants."

† *American Journal of Mental and Nervous Disease*, April, 1884, p. 256.

In an observation recorded by M. Augier, the aphasic symptoms seem to have been due to a cerebro-meningeal hyperæmia, caused by the excessive use of cider in a person who in early youth had been a great brandy drinker.*

The puerperal condition, by inducing cerebral ischæmia, may give rise to loss of speech. I have myself recorded, at page 131, a typical instance of this complication, in which lacteal derangement coincided with complete aphasia. We know but little of the effect of lacteal disturbance on the nervous system, and in a recent discussion at the Obstetrical Society of London, Dr. Matthews Duncan commented upon the neglect of the science of lactation, and the deficiency of literature connected with this important department of practice.

A French writer, M. Poupon, after analysing twelve cases of puerperal aphasia collected from various authors, divides loss of speech occurring in the puerperal state into two classes:—1st, Aphasia due to vascular disturbances ; 2nd, Aphasia from nervous derangement.†

In the category of causes we are now considering must be classed the poison introduced into the system by the bite of venomous snakes. M. Ruftz stated at a meeting of the Paris Anthropological Society, that he had seen a certain number of persons who had completely lost their speech in consequence of a bite from a serpent (*Fer de lance*) ; sometimes aphasia was produced instantly, and, at other times, some hours only after the bite ; but, what was most remarkable, those who survived the poisoning

* "Gazette des Hôpitaux," March 8th, 1866.

† Poupon. "Des Aphasies Puerpérales." *L'Encéphale*, No. 4, 1885, p. 393.

remained permanently aphasic. Van der Kolk quotes the case of a gunner in the Dutch Indies, who was bitten by a serpent called by the natives Oeloer; in a few minutes he became giddy and lost the power of swallowing; *there was total loss of speech*, but consciousness was unimpaired; death occurred four hours and a half after receipt of the injury.*

I have dwelt thus upon blood poisoning as a cause of impairment of speech, because it seems to me to have an important bearing on the question of localisation of the faculty of articulate language; for since in our days *humourism* has given way to *solidism*, there is a tendency to connect all abnormal cerebral symptoms with change of tissue, whereas temporary loss of speech, at all events, does not necessarily require for its production positive lesion of brain substance, any more than jaundice from obstruction and reabsorption of bile, need in all cases imply structural disease of the liver.

* Dr. W. D. Moore's Translation, p. 162.

CHAPTER IX.

Diagnosis.—Aphonia ; whispering is in reality an articulate language. Labio-glosso-pharyngeal paralysis. The speechlessness of lunatics. Importance of the quantitative analysis of the urine. The Sphygmograph and the Ophthalmoscope. Thermometric observation, and its value in cerebral pathology ; thermic exploration of the different cranial regions—Broca, Voisin, Lombard, and Maragliani. Auscultation of the parietes of the cranium. Prognosis—more favourable in traumatic cases. Professor Benedikt's case of tardy development of speech in congenital aphasia. Recovery of speech after suspension of the faculty for twenty years. Treatment—must depend upon the cause which produces it. Electricity. Influence of sudden mental shock. Trephining in traumatic aphasia. The re-education of the nervous centres.

Diagnosis.—Having in this essay employed the word aphasia in its widest and most general sense, as applicable to loss of speech from whatsoever cause, the existence of this defect is so easy of recognition, that but little need be said under the head of diagnosis ; although, as regards the various forms which this defect assumes, and the pathological conditions which give rise to them, the *differential* diagnosis becomes important.

I need scarcely observe that aphasia must not be confounded with aphonia, where the voice is only suppressed, but the faculty of speech remains. Aphonic patients can whisper, but are unable to speak audibly, owing to some affection implicating the tone of the vocal cords, and, as before stated, whispering is in reality an articulate language ; those persons, therefore, who are thus able to express their ideas, however inaudibly, should not be classed with aphasics.

Although it has been stated that this distinction was not observed by the older authors, still, from a careful study of their works, it will be seen that in many instances the confusion was only apparent, and depended on the use of a faulty nomenclature; for it is evident that the authors themselves were fully aware of the wide difference between these two morbid conditions.*

Aphasia may be apparent only, instances having occurred in the Eastern Counties' Asylum for Idiots, where children, who for many years had passed for deaf and dumb, unexpectedly gave evidence of the possession of the power of speech. One boy, supposed to be a deaf-mute, was heard one night to sing a chant which had been used at public worship, pronouncing the words distinctly, and giving the tune correctly. Another boy, also passing for a deaf-mute, broke into a violent passion in consequence of something on his slate being rubbed out, and demanded of another lad why he had done it.

In Labio-glosso-pharyngeal paralysis, the impairment of speech is not of a psychical character, but the result of functional disturbance of the peripheral organs; it is not the faculty of language, but the power of articulating, that is affected—it is, in fact, a mechanical defect dependent on paralysis of the tongue, lips, and of the muscles of the larynx.

We must not confound aphasia with the general decay of conversational power observable in general softening

* Hoffmann uses the word aphonia in the description of his cases, as does also Mr. Carmichael Smith in his extremely interesting paper in the Medical Communications for 1790; but it will be seen from a perusal of their clinical histories, that the authors intended to describe instances of inability to articulate.

of the brain ; such a case is recorded by Dr. Allbutt, where there was softening of the left anterior lobe on its upper surface ; the patient was unable to speak more than a few words, those being, however, for the most part quite appropriate. Dr. Allbutt considered the patient rather mute than aphasic.

A person may be dumb simply because he has no idea to convey, as in dementia. Insane patients have been known to continue for years without uttering vocal sounds, and this does not arise generally from any paralysis of the organs of speech. Dr. Brierre de Boismont has recorded the clinical history of a lunatic who had not spoken for thirty years, and who, when perseveringly interrogated, gave a kind of a grunt and ran away. About fifteen days before his death, he regained the use of speech, and answered perfectly well all questions put to him.

In an obscure subject like this we cannot afford to dispense with any of the auxiliary aids to differential diagnosis. With the view, therefore, of determining whether loss of speech depended in any particular case on softening, or whether it was the result of mechanical pressure exercised by a clot or by some morbid growth, it has occurred to me to make a volumetric analysis of the urine, upon the assumption that in cases of softening there would be more disintegration of nervous tissue, and consequently an excess of phosphorus removed from the system.*

On referring to those among my own cases where a quantitative analysis of the urine was made, it will be

* I am by no means prepared to say that this assumption is absolutely correct, but whether it be so or not, inquiries in this direction cannot be otherwise than useful.

observed that the results were negative, inasmuch as there was no deviation from the ordinary range, except in one instance—that of the patient Sainty—when the amount of chlorides was 10 parts per 1000, the ordinary range being, according to Beale, from 4 to 8 parts per 1000.

Although my own experiments in reference to the urine cannot be considered as in any way conclusive—being based on too small a number of cases—I cannot but think, however, that a quantitative as well as a qualitative analysis of the urine is imperatively called for in all cases of obscure cerebral disease; and since the introduction of the volumetric system, this analysis has become much easier of accomplishment, and ought never to be omitted where the least doubt exists as to exact diagnosis. “How many cases,” says Todd, “formerly supposed to be anomalous, are now readily understood by reference to uræmic poisoning through inefficient kidneys.”* Renal inadequacy has been shown by Sir Andrew Clarke to be a powerful pathogenetic factor, and many diseases, formerly but little understood, have been traced to kidneys which secreted urine not sufficiently rich in the ordinary matters of waste, which it is the business of these organs to discharge from the body.

The Sphygmograph may render essential service in affording a clue to the probable condition of the arteries

* Dr. Todd further remarks that there are many other points of interest in connection with the state of the urine in brain disease, which can only be settled by many observers, such as the variations of the phosphates, the quantity of the sulphates and the chlorides; and whether, in the marked increase or decrease of these salts or elements of the urinary secretion, we can derive any trustworthy aid to determine the inflammatory or non-inflammatory nature of the brain lesion.—“Clinical Lectures on Diseases of the Brain,” p. 311.

of the brain, and thus enable us to form an opinion as to whether aphasic symptoms are due to structural or merely functional disease. Dr. Sansom has kindly communicated to me the particulars of a case of aphasia, in which Dr. Anstie, on applying the sphygmograph, noticed a decrease of arterial tone, and that there was a decided difference between the two sides.

From the facility with which we can watch and note the changes in the optic nerve, the Ophthalmoscope may be of use as showing whether the aphasia is dependent upon organic change, or upon some temporary functional disturbance of the brain.

The researches of Broca, Auguste Voisin, Lombard, and others, show that the study of the cranial temperature is of the highest importance in cerebral pathology generally, and thermometric observation may be of assistance in the clinical recognition of the morbid lesion giving rise to the aphasic symptoms.

The result of Professor Broca's observations on aphasic patients has been to show an elevation of temperature above the left ear, in those who are the subjects of cerebral softening. According to the distinguished Parisian Professor, the increase is sometimes two or three degrees centigrade, and in that case it can be appreciated by the hand; when the rise in the temperature is less, the variation can only be recognised by the aid of the thermometer. M. Broca thinks that when aphasia is the result of *progressive atrophy of the third frontal convolution*, there is probably a decrease, instead of a rise of temperature, but this fact he has not yet verified.*

* M. Broca's method of taking the temperature in these cases is as follows:—He takes two perfectly similar thermometers, covers them with little bags of wadding, and then applies them on each side of the head,

Shortly before his death, this indefatigable labourer in the field of science instituted a series of experiments with the view of further testing the diagnostic value of the thermic exploration of the head, from which he obtained the following results:—

In twelve persons examined, he found the temperature of the right side of the head to be 33·90 centig., and that of the left 34, being a difference of only one-tenth of a degree. The examination of the different regions of the head, however, gave the following results:—

Regions.	Right side.	Left side.
Frontal . . .	35·28	35·48
Temporal . . .	33·72	33·96
Occipital . . .	32·92	33·23

The above statistics have reference to a state of intellectual inactivity in healthy individuals; this observer, however, added two pathological cases, and in both instances there was a fall in temperature of about half a degree in the left temporal region.

Another observer, Dr. Maragliani, of Genoa, says that the temperature of the left side of the head is always higher than that of the right; and that the temperature of the external orbital angle and behind the ear is higher than that of the external occipital protuberance.

According to Voisin, the temperature of the cranium by no means coincides with the variations of the axillary temperature; and the former is often much above normal, when the latter differs but slightly, if at

fixing them by means of a circular band. It is essential that the two little bags should be of the same thickness, weight, and form. At the end of ten minutes he reads off the position of the mercury, and marks the difference.

all, from the healthy standard. He also found that an encephalic local hyperthermia may exist without the coincidence of febrile symptoms. The points of the cranium upon which M. Voisin makes his investigations are the following:—The middle of the forehead; behind the ears; over the bregma; over the superior occipital protuberance; and over the temples.*

Although I have thought it right to make a brief allusion to the diagnostic value of thermometric observation, the results are somewhat conflicting, and I think it would be unsafe to draw any positive conclusions from cerebral thermometry in the present state of our knowledge of this subject.

A refinement in diagnosis has been suggested by an Italian physician, Dr. Adriani, who, relying upon the fact that on applying the hand upon the head of a person speaking, a vibration is felt, has suggested that in certain cerebral affections the modification of the voice might be transmitted to the ear of the observer by auscultation of the parietes of the cranium.† I am far from laying any stress upon this mode of investigation in the diagnosis of the various conditions of the brain causing aphasia, but I can conceive it possible that further researches in this direction may lead to satisfactory results.

Prognosis.—Some authorities have considered sudden loss of speech as necessarily indicative of grave cerebral

* A. Voisin. "Étude sur la Température des parois de la tête." I wish to direct especial attention to this important essay, which was read by its author at the International Congress of Mental Medicine, held at Paris in 1878.

† "Archives de Neurologie," 1882, V. iv., p. 117.

disorder. Dr. Winslow says it is most unusual for sudden speechlessness to exist without being immediately followed by acute cerebral symptoms. Dr. Copland seems to share the same opinion, for in his work on Palsy and Apoplexy, he says that "loss of the power of articulation, except in hysterical cases, is either attendant on, or followed by, the most complete or fatal states of palsy or apoplexy." Trousseau also considers the aphasia which is accompanied by hemiplegia, of the most serious import, and alludes to its frequent termination by "*apoplexie foudroyante*," giving three instances in which this fatal result ensued.*

A glance at the observations which I have recorded in the preceding pages, will show that loss of speech, although often of ominous and serious portent, is not unfrequently perfectly amenable to treatment, the function being sometimes completely restored in a very short time. The Prognosis, however, must necessarily depend on the cause which has given rise to the symptom; when it occurs as a sequel of continued fever, when it occurs as a neurosis, or is of hysterical origin, or when it arises from any moral cause, a recovery may be anticipated. The intercurrent of an exanthematous fever may coincide with a marked improvement, as was observed in a young girl under the care of M. Peter, at La Pitié, Paris, when a rapid cure supervened on the occurrence of an attack of measles.† A favourable result may be anticipated in aphasia of nervous origin, when the disturbance of speech occurs suddenly, and disappears rapidly. The age of the patient is an important element in the chances of recovery, and, as Küssmaul observes, children have

* "Clinique Médicale," tom. ii., p. 625.

† Lacambre. "Thèse de Paris," 1869, p. 60.

been known to regain their speech after very extensive destruction of the cortex of the left hemisphere.

Loss of speech in a patient whose heart, arteries, and kidneys are healthy, is of a different import to when there exists degenerative changes of these organs; in such instances the disturbance of speech is a small matter in comparison with the state of the system of the patients themselves.

I am inclined to think that the prognosis is more favourable when loss of speech depends upon direct injury to the brain; in the three cases of traumatic aphasia that I have mentioned as occurring under my own observation, the improvement was comparatively rapid, and attended by no relapse. Romberg mentions an instance of perfect re-establishment of the power of language after fracture of the frontal bone involving the orbit, from severe injury to the left side of the skull.

The chances of the complete restoration of the faculty are also much greater when the aphasia is simple and uncomplicated with any paralytic symptom. When hemiplegia co-exists with aphasia, the return of motor power usually coincides with a corresponding improvement in speech; this, however, is not always the case, as for instance in the observation of Sir Thomas Watson, to which I have already alluded, where, although the paralysis disappeared, there was no corresponding amelioration in the power of articulation.*

* In reference to the persistence of amnesic aphasia after the disappearance of all other morbid cerebral symptoms, Van Swieten has the following passage:—"Vidi plures, qui ab apoplexia curati omnibus functionibus cerebri recte valebant nisi quod deesset hoc unicum, quod non possent vera rebus designandis vocabula invenire; manibus, pedibus, totius corporis nixu conabantur explicare miseri, quid vellent, nec poterant tamen. Malum illud per plures annos sæpe insanabile perstat." *Van Swieten—Commentaria in Boerhaave*, tom. iii. § 1018.

When aphasia coincides with hemiplegia in elderly people, the ultimate prognosis is bad, for although some temporary improvement may ensue, a relapse is likely to occur. This, however, is not invariably the case; I am acquainted with a gentleman, who, at the age of sixty-one, had an attack of right hemiplegia with aphasia, and who, having had no relapse, now twelve years after the attack, is able to express himself with comparative fluency, with the exception of occasional forgetfulness of words. Moreover, aphasia complicating hemiplegia may persist for many years without apparently materially affecting longevity. I have had under my observation a lady, who, at the age of fifty-eight, had an attack of partial hemiplegia, with complete aphasia; on recovering from the paralysis, the total loss of speech continued till her death, which only occurred eleven years after the paralytic attack.

The prognosis, also, is not necessarily hopeless when the loss of speech occurs in early life and persists during many years. Whilst engaged in writing this chapter, I have been favoured with a private communication from Professor Benedikt of Vienna, in which he gives an instance of tardy development of speech in a case of congenital aphasia; the faculty of articulate language began to manifest itself as late as the age of twelve years.

A case is recorded by M. Charpentier of a boy, who, at the age of five years, as the result of an accident to his head, became quite speechless; this complete suspension of language lasted for twenty years, when, under the influence of electricity and other remedies, he suddenly recovered the power of speech. The case is of such exceptional interest that I append its leading features:—

The patient was an inmate of Bicêtre, without any cerebral, neurotic, or diathetic antecedent. The only abnormal symptom in early childhood was that he only began to talk at the age of three years; but from that period till the age of five years and a half, he spoke like other children. He had never been deaf, never had convulsions, and had never stammered; moreover, his language, intelligence, and general behaviour were those of other children of his age.

When he was five years and a half old, he was one day brought home from school with his head covered with bandages stained with blood; his parents had never been able to ascertain what had happened. The child got well without any loss of consciousness, delirium, convulsions, or paralysis; but from that moment he became dull, speechless, and, to use the words of his mother, he had become "like a mummy, silent, and concentrated upon himself." This state of things persisting, at the age of 14, he was placed at Bicêtre.

After he had been in the hospital about a year, M. Charpentier wished to try the effect of electricity. On the third application of the electric current, he said several times "Pardon, Monsieur." On the fourth day, on entering the ward, M. Charpentier was surprised to see the patient sitting up in bed, with a smiling countenance; he welcomed his physician with a volley of words spoken very rapidly—too rapidly even, (*à la manière de nos persécutés loquaces*); the style of his conversation was childish and silly, but what astonished those around him, was to hear him employ expressions which he could not have known at the commencement of his disorder, when he was only five years old.

Here, then, says M. Charpentier, was a patient, who, from the age of five to twenty-five years, could only say two or three words, always the same, and who suddenly began to speak and to use words and expressions which he must have acquired since, and notwithstanding, his mutism and his apparent stupidity. In further commenting upon this singular chain of morbid symptoms, M. Charpentier inquires whether there was not here

une émotivité particulière, the result of inhibition of the faculty of language.*

Treatment.—Having admitted that aphasia is only a symptom, and not a disease of itself, its treatment must obviously depend upon the cause which produces it, and must be based upon a precise knowledge of the physiological and pathological conditions underlying the abnormal mental phenomena. Still, some practical good may result from a brief consideration of the mode of treatment applicable to the various forms of loss or lesion of speech which are observed in practice; and at the same time the pathology of this obscure symptom may perhaps receive some elucidation from a brief analysis of the therapeutical measures, which have been more or less successfully adopted in the numerous cases which have now been submitted to the profession.

In those cases that are associated with hemiplegia, and where there is structural disease to account for it, there can be no special treatment for the aphasic complication; but in those instances where loss of speech is the sole or principal symptom, medical science may do something toward removing the morbid condition.

When the defect seems to depend on the circulation of some morbid product through the brain, in conse-

* *Annales Médico-Psychologiques*, March, 1886, p. 265. The recital of the above case at the Medico-Psychological Society of Paris, gave rise to an animated discussion, in which MM. Briand, Christian, Dally, and Garnier took part; the last two speakers maintaining that during the long period of his mutism, the patient must have retained the mental language—*le langage intérieur*, or he would not have been able to recover the power of speech.

sequence of some irritating matter in the blood, whether from faulty kidneys or sluggishness of other secreting organs, a treatment actively eliminatory will be found beneficial. Long before the attention of the profession was specially called to the lesion of articulate language, a remarkable instance of recovery of the power of speech after free purging, which brought away several fetid dark-coloured stools, was observed by Dr. Richard Jones.* A French physician, M. Mattei, has seen aphasia the consequence of constipation entirely removed by repeated injections; after giving minute details of this case, which is full of interest, he says, "*La malade a rempli en une demi-heure trois énormes vases de matières fécales, et lorsque l'intestin a été tout à fait vidé la parole est devenue aussi précise que si la femme n'avait rien eu.*"†

As far back as 1790, Dr. J. Carmichael Smith has recorded a case of loss of speech of some months' duration, which yielded to an emetic.‡

Surely the successful treatment of such cases as the above is very significant in reference to the question of localisation, and must be a source of difficulty to those who adhere to the doctrine of a separate and limited centre for speech.

When the aphasia has a syphilitic origin, or may be due to a tumour compressing the cerebral substance, Iodide of Potassium or Mercurials may be beneficial. At page 207, I have quoted a case reported by M. Pitres, in which a vigorous antisyphilitic treatment restored the speech in eight days.

* Edinburgh Medical Journal, 1809, p. 281.

† Gazette des Hôpitaux, June 15, 1865.

‡ Medical Communications, Vol II., p. 488. London, 1790. The particulars of this case are of extreme interest, as also those of two others described in the same communication.

Venesection or abstraction of blood by leeching or cupping may occasionally be useful where the morbid condition is dependent on temporary congestion, or on disturbance of the hydraulics of the blood ; in the case of Professor Rostan, as well as in that I have quoted from Dr. Jackson, of Pennsylvania, speech was rapidly restored by the abstraction of a little blood. When we have reason to infer that the brain lesion is of an irritative character—as perhaps indicated by early rigidity of the paralysed muscles, and by their extreme sensibility to the galvanic stimulus—we are justified in expecting some benefit from the abstraction of blood ; where an opposite condition exists, bleeding will probably be worse than useless.

When loss of speech occurs in hysterical and highly excitable persons, or is an accompaniment of the choreic or epileptic condition and may depend on a spasmodic state of the cerebral arteries, diffusive stimulants and antispasmodics will be found of service. Crichton mentions a case in which large doses of Valerian were effectual, and Dr. Hutchison, of the United States, has recorded a case where hysterical loss of speech was cured by Etherisation.*

The value of Electricity as a therapeutic agent in diseases of the brain has of late been duly recognised, and the numerous works that have appeared on this subject have awakened in the profession a sense of the important position occupied by this agent in neuro-pathology. There are certain cases in which the aphasia seems to depend on a kind of cerebral catalepsy, and where very powerful stimulants, such as electricity, prove of great

* Medical Times, July 29th, 1865.

value. I have elsewhere stated that in one of my own cases, that of Sutherland, electricity had a decidedly baneful effect; and in this affection, as well as in motor paralysis, this powerful remedial agent must be used with the greatest caution. In reference to its use, we cannot do better than observe the distinction laid down by Dr. Todd—that electricity is injurious when there is an early tendency to muscular rigidity, showing an exalted polarity of nervous tissue, and probably an irritating lesion of the brain; thus, when the aphasia is an accompaniment of muscular paralysis, the result of electricity on the limbs affected may serve to guide us in our diagnosis, by showing whether the lesion is irritative or depressing.

In the *Lancet*, for January 23rd, 1869, Dr. Marcet has mentioned a striking instance of the benefit of electricity in a case of hemiplegia with aphasia, where, after recovery from the paralysis, the loss of speech continued. Dr. Marcet, having determined to try galvanism with Smee's battery, one of the electrodes was applied, by means of Mackenzie's galvaniser, to the tongue, and the other to the back of the neck, in contact with the spine. Speech began to return from the very first application of the galvanism, and continued steadily to improve each time it was used.

There cannot be a doubt that electrical influences cause molecular changes of which we know but little, except that modification of function is the result. I should be disposed to try electricity in temporary and emotional aphasia as tending to improve the condition of the circulation of the parts concerned in the mechanism of speech; for, as Radcliffe says, it is more than probable that the beneficial effects of electricity in the resuscitation

of the paralysed parts are as much brought about indirectly by changes produced in the circulation, as by changes wrought directly in the nerves and muscles.

Strong mental emotion is often salutary in such cases ; we are all familiar with the story in Herodotus of the son of Cræsus, who had never been known to speak, but who, at the siege of Sardis, being overcome with astonishment and terror at seeing the king—his father—in danger of being killed by a Persian soldier, exclaimed aloud—*Ἀνθρῶπε μὴ κτείνε Κροῖσον*—Oh, man, do not kill Cræsus ! This was the first time he had ever articulated, but he retained the faculty of speech from this event as long as he lived.* Herodotus is universally admitted to be a trustworthy historian, but if it be thought far-fetched to illustrate a subject by allusion to a work written 500 years before the Christian era, I may add that such cases have been met with by other observers. The late Mr. Dunn has recorded a similar one, and a few years ago, I myself was invited by Mr. Allen, of Norwich, to see with him a man, aged 37, who had been in his usual health up to the day preceding my visit, when, during a meal, his wife noticed that all his limbs were shaking, and from this time he became speechless. The suspension of speech was unaccompanied by any symptom of

* Herod. Hist. I., 85. Aulus Gellius, after repeating the above story from Herodotus, relates a similar fact in the following terms :—*Sed et quispiam Samius athleta, nomen illi fuit Ἀγλαῖς, quum antea non loquens fuisset, ob similem dicitur causam loqui cœpisse. Nam quum in sacro certamine sortitio inter ipsos et adversarios non bona fide fieret, et sortem nominis falsam subjici animadvertisset, repente in eum, qui id faciebat, sese videre, quid faceret, magnum inclamavit. Atque is oris vinculo solutus, per omne inde vitæ tempus, non turbide neque adhæse locutus est. Noctes Atticæ, lib. v., cap ix.*

paralysis, and the loss of the faculty of articulate language continued for six days, when being asleep on his couch, he suddenly started up, and was heard to say three times, "*A man in the river!*" From this moment speech was restored, and when I saw him an hour afterwards, he told me that he had dreamed that a man was falling into the river; the mental shock produced by this dream was salutary, for it resuscitated the previously dormant faculty of articulate language.

Dr. Wigan mentions a similar example of the sudden excitation of speech. A London merchant had a son, eight years old, perfectly dumb, and the family had abandoned all hope of his ever being endowed with the gift of speech; there was no defect in the intellect nor lesion of any other faculty. In a water party on the Thames, the father fell overboard, when the dumb boy called out aloud, "Oh, save him! save him!" and from that moment, he spoke with almost as much ease as his brothers, and eventually entered his father's business.*

Again, Wiedermeister relates the history of a female who became speechless as she left her wedding breakfast to start on her bridal trip with her husband, and who remained so until she happened to see a church burning, when she cried out, "Fire!" and at once regained the power of speech.†

Ireland, in commenting on such cases, says, "Probably the injured nerve centres or conducting tracts have for sometime recovered their lost capacity, but through disuse and wasting, do not resume their functional activity till stimulated by some sudden mental excitement or

* "The Duality of the Mind." 1844, p. 377.

† Albg. Zeitschr. f. Psych. 1874. Bd. 28, s. 485.

electric shock, when they respond with a start, and afterwards continue to act.”*

The remarkable advance that has recently been made in Brain Surgery, and the unprecedented results that have been obtained, must materially influence the treatment of cases of traumatic aphasia. To old practitioners the brain area was considered as practically inviolable, and as “a dark continent in which they could descry neither path nor guide capable of leading them to a particular diseased area, and, did they attempt to reach it, it could only be by groping in the dark.” In the case I have quoted from Th Simon, at page 259, there cannot be a doubt that the operators of the present decade would have attempted some surgical interference by which the speech might have been restored, and the life of the patient prolonged. At a recent meeting of the surgical section of the Royal Academy of Medicine of Ireland, three successful cases of trephining were reported, one of which, that mentioned by Dr. C. D. Ball, has a striking bearing upon our subject.

A boy had been struck with a small knife over the squamous portion of the left temporal bone ten days before he came under observation at Sir Patrick Dun’s Hospital. The wound was healed, but he had some aphasia. Pain in the head and ear supervened, and the aphasia increased. It was determined to explore, and he was trephined some weeks after the original injury, when a wound was found in the dura mater corresponding to the puncture of the bone. A sinus forceps was passed in, the wound opened up, and some blood clot escaped; the patient was decidedly better, but next morning he was again aphasic. The wound was washed out, and more blood clot escaped; the aphasia almost immediately disappeared, but two days later it returned, and the wound was again

* On Thoughts without Words. “Journal of Mental Science,” Oct., 1878, p. 438.

washed out. After this the patient progressed favourably, and entirely recovered.

At the same meeting at which the above clinical history was related, Professor Thornley Stoker and Sir William Stokes mentioned similar instances of the success obtained by them by trephining, the record of which cannot fail to influence the views of the profession as to the possibility of giving relief in a class of cases hitherto considered as beyond the reach of surgical aid.

In our efforts at the restoration of speech, we must not lose sight of the fact that as muscles from want of use, lose their contractile power and become atrophied, so it is possible that the convolution or portion of brain presiding over articulate language—assuming *pro hâc vice* that there is such a localised centre—may, from long disuse and actual cessation of function, undergo a change of some kind, by which the patient may be somewhat in the same condition as that of a child who has not yet learned to speak; thus, one of the most interesting features in the treatment of certain cases of aphasia is the education of the organs of the speech, as it were, *de novo*.

Several instances have been recorded confirmatory of this view. M. Piorry relates the history of a merchant who had to re-learn his a b c.* Dr. Bank's case of the gentleman re-learning Greek and Latin is a further illustration, as also the remarkable observation of Dr. Hun, which I have recorded when treating of the American contributions to this subject.† Perhaps, one of the most satisfactory results of efforts to re-learn to

* Gazette des Hôpitaux, May 27, 1865.

† Vide Journal of Mental Science, April, 1868.

speak is that recorded by Dr. Osborne, in connection with his remarkable case to which I have already alluded under the head of *Varieties*. Dr. Osborne says:—"Having explained to the patient my view of the peculiar nature of his case, and having produced a complete conviction in his mind that the defect lay in his having lost, not the power, but the art of using the vocal organs, I advised him to commence learning to speak like a child, repeating first the letters of the alphabet, and subsequently words after another person. The result has been most satisfactory, and affords the highest encouragement to those who may labour under this peculiar kind of deprivation; there being now very little doubt, if his health is spared, and his perseverance continues, that he will obtain a perfect recovery of speech."*

Perhaps a still more remarkable instance of the success attending persevering and systematic efforts to instruct a patient in articulation, and to set in motion the mechanism of speech, is recorded by Dr. Bristowe in his *Lumlean Lectures on the Pathological Relations of the Voice and Speech*. The case is reported at considerable length, but it presented a combination of phenomena of such exceptional interest, that I have subjoined a condensed account of its leading features.

A Canadian, aged 36, after a series of epileptic fits, lost the power of speech, and became stone-deaf. He remained deaf and dumb for six weeks, when he regained his hearing. At the end of seven months, he was still unable to utter a single articulate sound; he seemed intelligent, and could understand all that was said to him; he could read to himself, and he understood everything that he read; he could, moreover, maintain a conversation of any length, he writing on his slate and his interlocutor speaking.

* Dublin Journal of Medical Science, Nov. 1833, p. 169.

As he could perform with his lips, tongue, and jaws, all varieties of voluntary movements, and was also capable of vocal intonation, Dr. Bristowe came to the conclusion that his inability to speak was probably due to his having forgotten how to combine automatically the movements of these organs, so as to obtain from them the elementary sounds which, in combination, constitute articulate speech, and he determined to teach him.

He informed the patient of his views of his case, which the latter appeared to understand perfectly. He explained to him that ordinary vocal sounds are composed of two factors, namely, *laryngeal intonation*, which he was still able to produce; and *articulation* effected by the lips, tongue, and associated parts, of which he was as yet incapable. He then got him to sound a laryngeal note, subsequently explaining to him, and showing him how to modify the shape and size of the oral passage and aperture; and getting him at the same time to expire, either with or without laryngeal intonation, he made him sound, both in a whisper and in a loud voice, certain of the more simple and obvious vowel sounds.

At his next lesson, he set to work to teach him the labials, and he subsequently taught him by the same process the lingual and guttural consonantal sounds; and thus, in the course of four or five lessons, principally by making the patient watch the movements of his (Dr. Bristowe's) lips, he regained the power of articulating all the simple vowel and consonantal sounds. He then began to teach him to combine letters, and eventually succeeded in making him talk well, although he spoke somewhat slowly and evidently had to give more thought to the pronunciation of his words than healthy people ordinarily do.

However hypothetical, therefore, the re-education of the nervous centres may, at first sight, appear, there exists sufficient evidence to induce us, in all cases where cerebral loss of speech is unattended by any marked lesion of the intelligence, to endeavour gradually to rouse into action the complex apparatus, the concurrence of which is necessary for the re-establishment of man's noblest prerogative—the Faculty of Articulate Language.

CHAPTER X.

On the Jurisprudence of Aphasia—French and German writers on this subject. Loss of Speech may affect both civil and criminal responsibility. The testamentary capacity of aphasics—a speechless Mayor; the validity of wills made by the deaf and dumb; remarkable case of a testator disposing of a large fortune by means of gesture language. On the capacity of speechless persons to manage their affairs generally; important case submitted to the Medico-Legal Society of Paris. The medico-legal aspect of the author's own cases recorded in this treatise. Word-blindness and Word-deafness may throw doubts upon testamentary capacity. Articulate language is not the only medium of thought and of expression;—the outward sign may be verbal, vocal, graphic, or mimic. Aphasia does not necessarily entail testamentary incompetency, or inability to discharge civil or social functions.

ON the Jurisprudence of Aphasia. Under this head, I propose to consider what modifications, if any, the aphasic condition may necessitate in the civil rights of the individual affected with this infirmity.

Questions of law have often arisen in our courts of justice in connection with persons deprived of the faculty of speech—whether such persons are to be considered to possess testamentary capacity; and whether, also, in other respects, they are legally responsible units in the social scale.

I am not aware that this important and interesting subject has been treated by any British writer; at all events, no systematic essay on the legal aspect of aphasia has come under my notice; some very important

communications, however, have issued from the French press, amongst others, those of Lasègue, Jules Falret, Legrand du Saulle, Gallard,* &c. ; and at a congress of German alienists held at Carlsruhe, Professor Jolly read a communication on the capacity of aphasic persons to testate, with a critical analysis of the views of German medical-jurists upon this point.

As I believe there is no code or law as to the legal capacity of aphasics, either in this or in any other country, and as, therefore, each particular case would have to be considered on its own merits, and dealt with according to its own peculiarities, I propose giving a brief sketch of the precedents which have been brought under my notice.

Loss of speech may affect both the criminal and civil responsibility of the person so affected ; the latter, which has been the most frequent subject of investigation, involves the question of the management and disposal of property, and the validity of a will.

I will first consider the testamentary capacity of aphasics. A will is one of the most solemn acts of social life, and its importance is attested by the scrupulous formalities with which legislators, in all ages and in all countries, have invested this document. There is something immutable about the expression of the last wishes of an individual, whose instructions are to be carried out when he himself shall have disappeared from the scene.

* L'aphasie au point de vue de la médecine légale. This formed the subject of one M. Gallard's clinical lectures at La Pitié, a complete analysis of which is given in *Le Journal de Médecine et de Chirurgie pratique*, tome 48, p. 378.

As far back as 1743, long before the attention of the profession had been directed to the subject of aphasia, a resident of Münden, who was deprived of the power of speech, applied to the Hanoverian government for permission to make a will in favour of his wife, by means of signs; and the Court acknowledged the validity of the act.*

An aphasic discharged during a period of five years the functions of mayor and of municipal councillor, by simply writing his name to the necessary documents, which he had learnt to do with his left hand. He also with his left hand wrote, at intervals, a holographic will, perfectly correct in every respect; the validity of this document was recognised by the law court.†

John Geale, of Yateley, yeoman, deaf, dumb, and unable to read or write, died leaving a will which he had executed by putting his mark to it. Probate of this will was at first refused, on the ground that there was not sufficient evidence of the testator's understanding and assenting to its provisions. At a later date, however, a fresh application was made to the Court, when the widow and attesting witnesses explained the signs and gestures by which the deceased informed them that the will was the instrument which was to deal with his property upon his death, and that his wife was to have all his property in case she survived him:—The said John Geale first pointed to the said will itself, then he pointed to himself; he then laid the side of his head upon the palm of his right hand with his eyes closed, and lowered his right hand towards the ground, the palm of the same hand being upwards. These latter signs, it was stated, were the usual signs by which he was in the habit of referring to his own death, or the decease of some one else. He then touched his trousers pocket (which was the usual sign by which he referred to his money); then he looked all round and simultaneously raised his arms with

* Hofhäuser—*Traité de Médecine Légale*. Paris, 1827.

† Billod—*Annales Médico-psychologiques*, tome xviii.

a sweeping motion all round (which was the usual sign by which he referred to all his property). He then pointed to his wife, and afterwards touched the ring-finger of his left hand, and then placed his right hand across his left arm at the elbow, which latter signs were the usual signs by which he referred to his wife.

After the above explanation, Probate was granted by the Court.*

Application for Probate was made to the Court, May 26th, 1870, under the following circumstances:—George Brook, the testator, was born deaf and dumb; he married a lady who was also deaf and dumb. Although a deaf-mute, he learned to read and write. He made a will appointing his father universal legatee and executor. Testator's son, Samuel Brook, disputed the will on the ground that the testator did not know and approve its contents. The deaf-mute widow, and some other deaf and dumb witnesses, were examined in support of the objection raised by Samuel Brook. On the other hand, the medical attendant of the testator, who was one of the attesting witnesses, proved that before signing the will, the testator took it in his hand, and appeared to read it, and then wrote a declaration that it was his will.

The Court came to the conclusion that the testator knew and approved the contents of the will, and pronounced for it, and ordered probate to be granted.†

In the above two cases deaf-mutism was very properly not considered by the Court as a bar to the disposal of property by will, as it is clear that in both instances the testators were able to give proof that they understood and approved the contents of the will; the former by gesture language alone, the latter by gesture and written language combined.

Those born deaf are incapable of speech, owing simply to their want of appreciation of sound; they have the capacity for speech, but from want of the faculty of

* Tylor—Early History of Mankind, p. 28.

† *The Times*, May 27th, 1870.

hearing, it cannot be called into action ; they can, however, express their thoughts by writing and by certain movements of the fingers.

Cases, however, may occur where, from serious cerebral and complicated disturbance, a still greater difficulty may exist in clearly ascertaining the testamentary capacity of the patient ; and this difficulty is well illustrated by a *cause célèbre*, in which the contending parties were resident in my own immediate neighbourhood.

The testator, the Rev. J. T. L., a widower, 63 years of age, was engaged to be married, when he was suddenly seized with right hemiplegia and aphasia. Although unable either to speak or to write, he could make himself understood by those around him by signs ; and by the language of gesture he succeeded in conveying to his medical attendants that he desired to make a testamentary disposition in favour of Miss R., whom he had intended to make his wife.

A card was procured and upon it, by the direction of the testator, the following words were written :—"£30,000 to Miss R., to be tied up to her for life, and after her death to come back to my family, and be divided fairly and equally."

This document was written by one of the medical attendants ; the testator then made a mark, not at the bottom, but in the middle, of the card, through the word "life ;" one of the doctors then wrote diagonally from this mark towards the right hand upper corner of the card the words "Mr. L——'s mark," and they both attested the execution of the document by placing their initials on the back of the card, with the words, "Witnesses to mark," and followed by the date, November 20th, 1885. Evidence was produced to prove that he subsequently showed this card to the lady whom he had intended to benefit, telling her that it was for her, and that he wished her to keep it.

The mode in which the testator communicated his wishes were as follows :—He made signs for writing materials ; his wishes were interpreted by means of signs, and then written down on the card. He held up his hand, extended his five fingers, and he was asked if

he meant "thousands;" he bowed assent. He then closed his hand, and opened it in the same way, implying ten; this operation was repeated till it amounted to thirty, and then he dropped his arm down. Testator was then asked whether he wished Miss R. to have thirty thousand pounds, and he nodded his head. In order that there might be no mistake about his wishes as to details, he was asked whether Miss R. was to have this sum absolutely; he signified dissent, but on being asked if it was to be hers for life and afterwards revert to his family, he bowed his head.*

It will be observed that the nature of the testator's wishes was ascertained principally by putting questions, to which he signified approval or dissent by nodding or shaking his head as he lay in bed. The amount of the bequest he wished to make was ascertained by opening and shutting the digits of his hands, to represent thousands, and by the testator signifying approval when the sum of thirty thousand pounds was thus reached.

From a consideration of the above facts, it seems clear that the witnesses did correctly interpret the meaning of the testator's signs, which evidently expressed his testamentary wishes; his gestures answered to rational conceptions, and were therefore external but not oral manifestations of the *verbum mentale*; and this view was taken by the President of the Court, who held that the writing on the card constituted a valid testamentary document, that the writing of the witnesses on the back of the card was also a sufficient attestation, and that the will would have been allowed to stand if the testator's mark had been placed at the bottom or foot of the card; but as the mark was made in the middle of the card, its position was not such as to satisfy the provisions of the Statute of

* Law Reports, Probate Division, Vol. xii., 1887, p. 8.

the Wills Act (iv. Vic., chap. 26, sec. 9), or of Lord St. Leonard's Act (xv. Vic., chap. 24, sec. 1), and the instrument was not duly executed, and consequently not entitled to probate, which was accordingly refused.

Besides disputes as to the validity of a will, the question of the capacity of an aphasic person to manage his own affairs may arise in a variety of ways. The following case is a good illustration of the difficulty in which loss of speech may sometimes place an individual thus affected, and it is all the more interesting as it formed the subject of a formal discussion in a scientific body, perhaps the most competent in Europe to deal with this question—La Société de Médecine Légale de Paris.

A merchant, aged 62, having acquired a fortune in his business, was attacked with right hemiplegia and complete aphasia. After some months of treatment, including a season at the baths of Balaruc, he improved so as to be able to walk, although imperfectly; the arm, however, continued quite paralysed, and the aphasia persisted.

Later on the paralysis in the arm yielded somewhat, but the power of speech was limited to the sounds—O, o, a qui. Whatever was said to him, he replied by these same syllables; but he was able to make himself understood by articulating these words with different intonations, accompanied by very expressive signs executed by the head or by the left hand. His wife, more accustomed than others to his language, interpreted what he wished to say; and if she happened to convey a wrong notion of what he desired to say, he showed great irritation, and endeavoured to make himself better understood by more expressive gestures. As his right hand was paralysed, he had learnt to write with the left hand; but if left to himself he could not write spontaneously, without copying—he required a model under his eyes, and could only re-copy what was written and set before him.

In order to test the degree to which he had retained his intelligence, it was pointed out to him that it would be to his advantage to collect his rents every month, instead of allowing them to accumulate for six months; he indicated very clearly that he understood this advice, and that he entirely approved it, and he informed his wife that for the future he wished his rents to be collected in the manner advised.

It was evident that in spite of his speechlessness, he had in a great measure retained his intelligence and his power of volition, and he knew perfectly well the state of his affairs. He frequented places of public resort, and would pay for what he ordered without making any mistake; he was in the habit of seating himself near those who were playing at cards, and he would intimate his approval or disapproval of their playing, and even venture upon advice, by means of signs; he would play bezique himself without committing blunders; in fact, he kept up a sort of communication with his neighbours by means of signs, which testified to the preservation of his intelligence.*

The relatives of this gentleman had demanded what the French law calls an "interdiction," and, after a prolonged discussion, the Société de Médecine Légale decided that his condition did not justify his being deprived of his civil rights; and the Tribunal at Avignon, to which the case was subsequently submitted, gave a decision in conformity with the views of the Legal Medical Society.

There cannot be a doubt about the propriety of the above decision. This gentleman was the subject of motor aphasia; he was unable to express himself by articulate language, but he possessed to an eminent degree the language of signs. It will be observed that he was also the subject of agraphia, for although he

* Annales d' Hygiène Publique et de Médecine Légale, tome. xxxi. p. 430.

could copy, he was unable to give spontaneous expression to his wishes by written language; he could originate nothing in writing, if his model were withdrawn he was incapable of writing a single letter.

Of the numerous cases that I have recorded in the earlier part of this treatise, as calculated to illustrate the legal capacity of the aphasic, I would specify particularly those of W. Sainty and R. Dalliston, whose clinical symptoms fell under my own immediate observation, and which are described in minute detail in the fourth chapter (vide pp. 100 and 186).

It will be remembered that Sainty, the waterman, after he was completely deprived of the power of speech, took charge of his vessel, and removed it from one point of the river to another; on the following day he loaded it with a fresh cargo, and then, unaccompanied by any of his friends or comrades, took the train to his own home, a distance of twenty miles. Although utterly speechless, no doubt whatever could have been raised as to his capacity to make a will or otherwise legally dispose of his property.

The case of R. Dalliston is still more to the point, as he lost the entire power of speech for six weeks; but although there was complete suspension of the faculty of *articulate* language, the *general* faculty of language was unimpaired, as he had retained the other media of thought and of expression, being perfectly able to describe all his symptoms in writing, as also by dactylology; for by means of the signs constituting the deaf and dumb alphabet, he kept up a conversation with the clinical assistant, who happened to understand and could practise this means of communication. He could

phonate; there was no paralysis of the lips, facial muscles, palate, or tongue; these organs, for all purposes except speech, were completely under control. His intellect was clear, for the house surgeon informed me that he passed his time in writing sermons! He was clearly in possession of the acoustic word-signs, and he retained words in his memory as sensory images and as symbols of thought, as shown by his capacity to translate the same into writing, although he could no longer enunciate them as a motor combination of articulate sounds. The idea was present, the words were not wanting, but articulation was not at the service of the words; in fact, his language was interfered with more from its mechanical than from its intellectual side. Had it been necessary, he was, of course, quite able to make a will or execute any document whatever having reference to the disposal of property.

In all the cases that I have cited in this chapter, the aphasia was of the motor type, being the result of injury to the *expressive* mechanism of speech; but when the patients are the subjects of Sensory Aphasia, which is a disorder of the *impressive* mechanism of speech—whether in the form of Word-deafness or of Word-blindness—I can conceive that the gravest doubts may arise as to how far they are able to make known their wishes.

For instance, the word-deaf hears what is uttered in his presence, but as there is an effacement of auditory images, the words used fail to revive in his memory corresponding ideas. The history of Marie Bouquet (which I have given at page 220) is a good illustration of the difficulties that surround word-deafness. In her case

there was "complete interruption in the association of articulate sounds with acts of articulation and of things signified." She could speak, read, and write, but there was no revival of auditory impressions; and she furnished a typical instance of a psychical trouble, characterised by an inability to understand spoken words, although the organ of hearing itself was unaffected.

Likewise the word-blind, provided there were no agraphia, would be able to write his instructions to his lawyer; but, to the astonishment of the latter, his client would be unable to read what he himself had just written. The case I have quoted from Professor Charcot's lectures (vide p. 227) illustrates the difficulty a word-blind would experience in satisfying his interlocutor that he understood the purport of his instructions. It will be remembered that in M. Charcot's patient there was "interruption of the association formed between written symbols and their equivalent articulations, and with things signified." He had retained the power of auditory *reception*, as well as that of verbal and graphic *transmission*; but he had lost all idea of the symbols of written language from the *receptive* point of view—he was able to write, but presented the singular phenomenon of not being able to read his own handwriting.

It will, therefore, be seen that the study of Word-deafness and of Word-blindness, so interesting to the general physician, is of capital importance to the medical jurist; for without a knowledge of the pathology of these singular affections, great injustice might accrue to those affected with these forms of psychical disturbance.

The civil law in all countries has taken under its protection those suffering from insanity, and has pro-

mulgated measures not only to protect them from the cupidity of others, but also from the effects of their own delusions; it, however, has not been found practicable to frame a code applicable to those persons who are simply deprived of the faculty of articulate language.

The legal codes in various states could not possibly enter into all the details of cerebral pathology, for the simple reason that at the time they were framed, the science of psychology as applied to language, was in its infancy; and even in the present day, when so much has been done to elucidate the disorders of the brain and nervous system, it is impossible to formulate any precise rules, as to how far an individual deprived of the power of speech is incapacitated for the full exercise and enjoyment of his civil rights—each case must be determined upon its own merits, and its own peculiar features.

It was formerly held that persons deaf and dumb from their birth were, in contemplation of law, idiots, but this presumption is no longer recognised; if it can be shown that such persons have the use of their understanding, they are considered as amenable to the laws of the country for their acts;* they are allowed to marry,† and

* A prisoner, who was dumb, was charged with larceny; it transpired that he had been in the habit of conversing by means of signs, and a woman was called who stated that the prisoner was capable of understanding her by means of signs; he was therefore arraigned, put upon his trial, convicted, and received sentence of transportation. Roscoe—"Digest of the Law of Evidence," 10th Edition, 1884, p. 117.

† At St. Lawrence Church, Norwich, on August 21st, 1871, Mr. W. B— was married to Miss G—. Both parties were deaf and dumb, as also were the two bridesmaids! The service was conducted by the Rev. A. Pownall, of Trowse, by means of the deaf and dumb alphabet; although performed with great rapidity, it was perfectly intelligible to the parties concerned, though it was quite a "dead language" to those who had assembled to witness the ceremony.

are recognised as competent witnesses in courts of justice, where they may be examined through the medium of a sworn interpreter who understands their signs.*

The mere fact of inability to speak will not absolve a person from civil or criminal responsibility, whether the defect be congenital as in the deaf-mute, or acquired as in loss of speech from cerebral disease in after life ; such persons, unless the contrary can be proved, are presumed by law to be accountable for their actions.

There cannot be a doubt that in all the cases that I have quoted as having been submitted to the judgment of legal tribunals, the decisions have been logically correct, and quite in accordance with the dictates of modern science.

As I have elsewhere stated, articulate language is by no means the only medium of thought and expression,† for as Maudsley observes, "Language consists essentially in the establishment of a definite relation between the

* On one occasion the judge of the Lambeth County Court had to decide a cause on the sole testimony of three deaf and dumb witnesses, viz., the plaintiff and his wife on the one side, and the defendant on the other. Taylor—"The Law of Evidence," 1872, Vol. ii., p. 1194.

† In an interesting chapter on possible modes of expressing thought, Farrar says that all actual language addresses itself to the eye or to the ear ; that art may be regarded as a language ; that in moments of extreme passion, a language of gesture, appealing to the eye rather than to the ear, is not only possible but extremely powerful, and one which will never be entirely superseded. Who, says he, that in modern days has seen a Kemble or a Siddons, a Rachel or a Helen Faucit, can be ignorant of what a language may be uttered by every motion and every look ? Yet it is probable that even the first of our modern actors falls short in this respect of the skill of the ancient pantomimes, of whose '*loquacissimæ manus, linguosi digiti, silentium clamosum, expositio tacita*,' Cassiodorus gives so lively a description. Farrar—"Language and Languages," chap. vi.

idea and the sign by which it is outwardly expressed ; it may be verbal, vocal, graphic, or mimic. . . . In man the tongue has been almost exclusively appropriated for the expression of thought, but there is no absolute reason why his fingers, hands, and arms might not be used, like the antennæ of ants, and the hands and fingers of the deaf-mute, to express all the results of mental action.”*

I have in a previous chapter gone so fully into the distinction between *natural* and *artificial* language, that I will not dwell upon it here, further than to say that the General Faculty of Language was not abolished in any of the cases I have quoted in this section ; for the subjects of all of them retained the language of Gesture, which, as before stated, is the natural language of the deaf and dumb, and which is adopted amongst all nations, when from ignorance of a foreign tongue, they are obliged to communicate without an interpreter ; by this form of language they were fully able to convey to the minds of others what was passing in their own.† Gesture language has been developed to such an extent, that the services of religion are performed in signs in many deaf and dumb schools ; and Tylor tells us that in the Berlin Institution the simple Lutheran

* Maudsley—“The Physiology of Mind,” pp. 475, 481.

† Mr. G. J. Romanes in his recent work on “Mental Evolution in Man,” has gone very fully into the question of gesture language :—“Etymologically the word Language means sign-making by means of the tongue, *i.e.* articulate speech. But in a wider sense, the word is habitually used to designate sign-making in general, as when we speak of the ‘finger-language’ of the deaf and dumb. . . . Gesture language admits of being developed to a degree which renders it a fair substitute for spoken language, when the ideas to be conveyed are not highly abstract.”

service—a prayer, the gospel of the day, and a sermon—is acted every Sunday morning in the gesture language, for the children in the school, and also for the deaf-and-dumb inhabitants of the city, constituting a very remarkable sight.

Whilst engaged in writing this chapter, I have received from America, a report of a meeting of "The Empire State Association of Deaf-Mutes," held at Rochester, U.S., on August 29th, 1888. At this Congress, the president's opening address was delivered in signs, and it is stated that his remarks met with a hearty response from his deaf-mute audience, whose frequent applause testified to its concurrence in the sentiments expressed. Can anything be more conclusive than this touching incident, as showing how Natural Language, can, when necessary, replace Articulate Speech?

That close observer of human nature, the great Italian poet Dante, in his "Paradiso," has the following striking passage on Natural Language:—

"Opera naturale è ch' uomo favella ;
Ma così, o così, natura lascia
Poi fare a voi secondo che v' abbella."

"It is a natural thing that man should speak ;
But whether this or that way, nature leaves
To your election, as it pleases you."

I have said enough to show that Aphasia does not necessarily entail testamentary incompetency or inability to discharge civil or social functions ; in fact, wills or other legal documents should, as a rule, be recognised as valid, when the parties concerned understand fully what is put before them, and can express assent or dissent with certainty, whether by articulate, written, or gesture language.

CHAPTER XI.

Summary—The Psychology of the ancients ; their crude notions of the functions of the brain ; Hippocrates, Aristotle, Servetus, Descartes, Lapeyronie, Willis, and Huarte. The different theories as to the seat of speech ; Gall, the pioneer of cerebral localisation ; his system of Phrenology ; the value of his researches. A faculty should not be confounded with the corporeal organ upon which its external manifestation depends. The various theories of the localisation of the faculty of articulate language considered, and weighed by the evidence contained in the preceding chapters.

IN the earlier chapters of this treatise, I entered into the subject of the bibliography of aphasia, as illustrated by the French, German, Dutch, British, and American writers ; a detailed account was then given of the clinical history of cases that have fallen under my own immediate observation ; I then described the different forms and varieties in which loss or lesion of articulate language is met with in practice ; whilst in the last chapter, I have considered the subject in reference to the question of Cause, Diagnosis, Prognosis, and Treatment.

We are now, therefore, in a position to criticise the value of the different opinions which have been propounded as to the precise point of the cerebro-spinal centre which is affected in aphasia, or in other words, to consider whether there be a cerebral seat of speech at all, and if so, where it is located ; and I now propose to

summarise, and carefully to weigh the evidence furnished by the numerous cases recorded in the previous pages. Leaving for the present the question of the existence or non-existence of a speech centre, and assuming *pro hac vice* that there is one, I shall proceed at once to consider the different theories which have been from time to time promulgated as to the seat of articulate language.

The ancients seemed to have possessed the most crude notions of the functions of the brain, as evidenced by Hippocrates assigning the seat of the mind to the left ventricle; and by Aristotle also placing the sensorium commune in the heart, the brain according to him, being an inert viscus, serving no other purpose than to refrigerate the heart. Michael Servetus, who flourished in the sixteenth century, and who seems to have been endowed with a large measure of the imaginative faculty, believed the choroid plexus was the organ destined to secrete the animal spirits, that the fourth ventricle was the seat of memory, and that the habitation of the soul was in the aqueduct of Sylvius. A century later, René Descartes, who so freely indulged in metaphysical and transcendental speculations, assigned to the soul a more secure position in the pineal gland,* whilst Lapeyronie placed it in the septum lucidum.

In later times, the brain has been universally considered to be the organ of thought and intelligence, but

* This prerogative of the pineal gland seems to have been a subject of interest to the scientific world generally in the seventeenth century, for we find our own countryman Willis, a contemporary of Descartes, in his *Anatomy of the Brain*, stating that the pineal gland is not only found in man and four-footed beasts, but that fowls and fishes also are endowed with the same. "Wherefore, although from hence it may be concluded that this is of necessary use, yet we can scarcely believe it to be the seat of the soul,

opinions have been and are still divided, as to whether it is to be regarded as a single organ, or as consisting of a series of distinct organs, each endowed with a special and independent function—whether, in fact, the phenomena of intelligence are due to an action of the brain as a whole, or whether the different psychological elements which constitute them are connected with isolated and circumscribed parts of the encephalon.*

Out of the last theory has arisen the principle of the localisation of the cerebral faculties, which was first announced in a definite form by Gall, who divided the encephalon into organs endowed with primordial faculties, distinct the one from the others. The germ of this idea of the polysection of the encephalon is to be found in the writings of physiologists long before the time of Gall; indeed, one writer, Charles Bonnet, assigned a special function to each fibre; stating that every faculty, sensitive, moral, or intellectual, was in the brain connected to a bundle of fibres, that every faculty had its own laws which subordinated it to other faculties and determined its mode of action, and that not only had every faculty its fasciculus of fibres, but that every word had its own fibre!†

or its chief faculties to arise from it; because animals which seem to be almost destitute of imagination, memory, and other superior powers of the soul, have this gland large and fair enough."—Willis. *Cerebri Anat.*, cap. xiv., p. 102.

* Those who may desire more detailed information as to the various theories of the seat of speech which were in vogue before the time of Gall, I would refer to an extremely interesting series of papers published by the late Dr. Hunt in the "Anthropological Review."

† A Spauiard, Jean Huarte, who lived in the sixteenth century, published a work on the diversity of aptitudes, intellectual and instinctive, and he proposed that a jury of scientists should determine what course of

In more recent times, some physiologists have carried their localising tendencies so far as to assert, that certain ultimate microscopic elements of the grey matter of the brain (ganglionic cells) are endowed with a distinct psychological function; and a writer, in commenting upon the number and precise arrangement of the cerebral elements, conjectures that there may be, in the higher cerebral centres, something like one thousand million corpuscles, and five thousand million fibres; and that thus for each nervous grouping of a certain complexity, there would be from five to twenty thousand cells, and from twenty-five to one hundred thousand fibres.*

The circumstance which directed Gall's attention to the possibility of connecting the brain with certain faculties of our mental nature is so well known that I scarcely need allude to it. In his early days, he often found himself surpassed by certain of his fellow students who he felt were intellectually inferior to himself, but in whom a remarkable memory coincided with a striking prominence of the ocular globes. This external prominence led him to the inference that there was an internal cerebral prominence which produced it, and it was the application of this reasoning to other cranial protuberances that gave rise to his craniological doctrine. According to Gall, the brain is composed of various parts, to each of which a special function belongs, and his system embraces the topographical determination of each of these organs. The organs of the memory of

study should be assigned to each child, and what career should be selected for each adolescent. He does not seem, however, to have founded his theory upon any cranioscopic investigations.

* "Mind and Body." By Alexander Bain, LL D. 1873.

words, of the memory of persons, and of the faculty of language, he located in the convolutions which rest on the floor of the orbit, and which form the inferior surface of the anterior lobe; the organ of the memory of persons he placed immediately above the inner angle of the orbit, that of the memory words in the convolution which rests on the posterior half of the roof of the orbit, whilst the organ of language or speech he placed in the convolution which rests on the anterior half of the orbital roof, in front of the preceding faculty.

The minute anatomy of the convolutions was unknown in the time of Gall, and he based his phrenological theories rather on the external prominences of the skull—on craniology—than upon a careful study of the convolutions to which these prominences corresponded, and although his conclusions must be considered in many instances arbitrary and hypothetical, still I would say, “Let not the spark be lost in the flame it has served to kindle,” for in spite of all that has been said against Gall, and all that has been written in depreciation of his labours, beyond all doubt his researches gave an impulse to the cerebral localisation of our faculties, the effect of which is especially visible in our own days; and I look upon his work as a vast storehouse of knowledge, and as an imperishable monument to the genius and industry of one of the greatest philosophers of the present age. The localisation of cerebral function may be said to have received the first real impetus from Gall, for before his time no such attention was given to the subject as deserved the name of systematic study.

Gall's labours would undoubtedly have met with a more hearty recognition from his contemporaries, had not the Austrian priesthood raised the cry of “material-

ism" as applied to his doctrines.* In defending himself from this charge, and with the view of explaining that the plurality of the cerebral organs is not opposed to the unity of the Ego, Gall thus expresses himself:—"When I say that the exercise of our moral and intellectual faculties depends upon material conditions, I do not mean to imply that our faculties are a product of the organism; this would be confounding *conditions* with *efficient causes*." The great German psychologist had no such heterodox notions as his adversaries maliciously attributed to him, for, to use the language of Hufeland, 'he was employed in analysing the dust of the earth of which man is formed, not the breath of life which was breathed into his nostrils;' or, as Froude philosophically remarks, 'It is nothing to me how my Maker has been pleased to construct the organised substance which I call my body. It is mine, but it is not I.'

In my treatise on "Darwinism tested by Language," I have entered at considerable length into the question of the mysterious connection between Matter and Mind, and I shall not dwell upon it here further than to re-

* As in Gall's days so in ours, this very indefinite and unmeaning word "materialism" is used as a kind of psychological scare-crow to frighten all those who are endeavouring to trace the connection between matter and mind. Surely there is nothing contrary to sound theology in assigning certain attributes or functions of an intellectual order to certain parts of our nervous centre; the cerebral localisation of our divers faculties, and the plurality of our cerebral organs, strike no blow at the great principle of the moral unity of man. The same power that caused the earth 'like a spark from the incandescent mass of unformed matter, hammered from the anvil of omnipotence, to be smitten off into space,' this same power, surely, could just as well ordain that a multiplicity of organs should be necessary to the full development of man's mental faculties, as that the manifestation of them should depend upon the integrity of one single organ.

mark, that the material condition which renders the exercise of a faculty possible is the existence of an *organ*; but it is important not to confound the faculty itself with the corporeal organ upon which the external manifestation of this faculty depends.

Gall's conclusions were based purely on the study of anatomy, but subsequent observers — Bouillaud, Schröder Van Der Kolk, Broca, and others—have brought the light of pathological observation to shine upon this obscure subject; and, with the view of testing the soundness of the respective theories advanced by these physiologists, I propose briefly to weigh the evidence which has been furnished for or against the various theories which have, in modern times, been promulgated as to the seat of speech, and to endeavour to guide my readers through this labyrinth of contradictory affirmations. Here, however, I would observe, that this question will never be settled by mere theoretical speculation, without the aid of that inexorable scrutiniser of facts—necroscopic examination; moreover, the scientific facts must be accepted as they are found, without any attempt to make them fit in with preconceived ideas. It is in the above spirit that I propose to try and ascertain how far the evidence contained in the preceding chapters is calculated to support any of the promulgated theories as to the seat of articulate language.

I will first discuss the theory which has perhaps found the fewest advocates—that of Schroeder Van Der Kolk—who placed the seat of speech in the corpora olivaria, which he believed were connected with each other and with the facial and hypoglossal nuclei by com-

missural fibres. This doctrine has lately found a warm supporter in M. Jaccoud, who thus expresses himself in reference to it;—"The functional centre of the articulation of sounds and of deglutition is situated in the medulla oblongata. It is constituted respectively by the union of the hypoglossal, the facial, the glosso-pharyngeal, the spinal accessory, and the trifacial nerves. For the isolated movements of the tongue, of the lips, of the cheeks, of the velum palati, and of the pharynx, each of these nerves acts independently in its sphere of distribution; but for the complex and simultaneous movements which are necessary for the production of articulate sounds and of deglutition, all the original nuclei of these nerves are connected together, also the one side with the other, by the olivary system, which thus becomes the co-ordinating organ of the final functional act."*

Kussmaul says that this hypothesis must be definitely abandoned; that neither Deiters nor Meynert have been able to find any commissural fibres; and that the evidence furnished by comparative anatomy is directly opposed to this theory. The parrot and other animals capable of imitating and mimicking articulate speech possess no olivary bodies, or possess them only in a rudimentary form; while the seal, whose reputation for eloquence has not yet been established, has these bodies of enormous size.†

M. Vulpian also criticises most severely Van der Kolk's conclusions, and quotes a case observed by himself, where, although the olivary bodies were both

* Gazette Hebdomadaire de Médecine et de Chirurgie, July 22, 1864.

† Die Störungen der Sprache, cap. xviii., s. 67.

manifestly diseased, yet speech remained perfectly unimpaired to the last.*

Of the numerous cases to which I have called attention in the preceding pages, I find that in five only the olivary bodies were stated as having been found diseased after death. The first three cases are quoted by Van Der Kolk. In one of these, in addition to atrophy of the olivary bodies, there was an extremely imperfect development of the frontal convolutions, and also a positively diseased condition of the anterior lobes; in another case, although there was found grey degeneration of the right olivary body, there was also disease of other parts, namely, in the *crura cerebri*, the *corpus callosum*, one of the *thalami*, the *fornix*, and the *corpora pyramidalia*; in the third case I have quoted from Van Der Kolk, as well as in one from Abercrombie, in addition to the disease in the *corpora olivaria*, there was also disease in one of the *crura cerebelli* and in the *tubercula mamillaria*; and, lastly, in a case observed by Romberg, the affection of the *corpus olivare* coincided with disease in the right half of the *pons Varolii*. It must, therefore, be conceded, that as in all these, in addition to a diseased state of the olivary bodies, there was extensive disease in other parts, they cannot be looked upon as substantial evidence in favour of the localisation of speech in the *corpora olivaria*; in fact, Cruveilhier, who was the author of all the observations which I have quoted from Van Der Kolk's work, was quite innocent himself of drawing from them any inference as to the connection of the olivary bodies with the articulation of words.

* *Leçons sur la Physiologie générale et comparée du Système Nerveux*, p. 495.

In one of the most important contributions to the anatomy of the medulla oblongata published in this country, its author, Dr. Lockhart Clarke, mentions two cases of aphasia, in each of which one of the olivary bodies was diseased; being in the one case atrophied, and in the other the seat of a former clot. In both these instances there were numerous and extensive lesions in other parts of the brain, therefore—as Dr. Clarke also admits—they by no means prove that the loss of speech was due to the diseased condition of the olivary bodies. Elsewhere he says, ‘whether or not the olivary bodies be subservient to the operations of speech and deglutition, it is quite certain that these are not their only functions. We have seen that in all the mammalia except the mute porpoise, they are very much smaller than in the monkey, who is wholly unable to articulate, and in whom the act of deglutition has nothing peculiar. But even if it should be imagined by some that the chattering of the monkey is a kind of speech, the ourang outang and the chimpanzee are not more gifted in this respect than the inferior tribes, yet their olivary bodies are much more highly developed. Now, except the superior intelligence, the only endowments that distinguish the ape-tribe from all other mammalia, are their singular faculty of imitation and gesticulation, and their power of expressing a variety of emotions, of which they are very susceptible.’*

Of late years, much attention has been given to the physiology of the Pons Varolii, and a great deal has

* “Researches on the Intimate Structure of the Brain.” Philosophical Transactions 1868, Pt. I., p. 312.

been written about its functions ; and some physiologists have attempted to locate speech in that organ.

Dr. Allen Starr, of New York, has published minute details of the clinical history of 23 cases of disease of the pons, verified by post-mortem examinations, and in none of these was there what could be called aphasia, although in some instances, the speech is mentioned as being impaired in some way or other, deglutition being affected also. In one case of softening of the pons, it is stated that speech became unintelligible as the facial paralysis increased ; the tongue also became partly paralysed, and before death could hardly be protruded. In another case, where there was hæmorrhage into the pons, the speech was slow, jerky, and drawling, but there was no aphasia.*

I have thought it right to make a passing allusion to the Pons theory, rather as a matter of literary curiosity, for it has not received any general support, and doubtless the disturbance of speech observed in disease of the pons is due to faulty innervation of the apparatus of phonation.†

The next theory for consideration is that of M. Bouillaud, who placed the seat of speech in the anterior lobes,

* "The Sensory Tracts in the Central Nervous System." *Journal of Nervous and Mental Disease*, July, 1884, pp. 357—377.

† In an original and very remarkable essay, entitled "The Brain not the Sole Organ of the Mind," another American writer, Dr. Hammond, mentions certain curious facts which have an indirect bearing upon this subject. He quotes a case of an anencephalic child, who was able to cry, although there was not a vestige of cerebrum. He contends that the mental faculties of perception and volition are seated in the spinal cord, as well as in the cerebral ganglia ; and he cites numerous experiments in support of the inference, that mental power must be conceded to the spinal cord, and that the brain can no longer be considered as the sole organ of the mind.

and who, twenty years ago, offered a prize of 500 francs for any well authenticated case negating his views. Although this theory has met with less opposition than the others, several cases have been recorded which, to say the least, throw considerable doubt upon its truth. Let us see what evidence the previous pages of this treatise furnish for or against the views of M. Bouillaud, who, it must be remembered, admitted that speech may exist with one frontal lobe destroyed, but who maintained that when both are destroyed or seriously damaged, articulate language becomes impossible.

I have quoted three cases* in which both anterior lobes were destroyed or very extensively injured. What does a conscientious analysis of them teach us? In M. Peter's case we have seen that speech was preserved, although both frontal lobes were reduced to a pulp (*réduits en bouillie*); in one of M. Trousseau's cases, a ball had traversed the two frontal lobes at their centre, entering at one temple and making its exit by the other, articulation remaining unimpaired during the six months the patient survived this fearful injury; in M. Velpeau's celebrated case a scirrhus tumour had taken the place of the two anterior lobes, but instead of being speechless the man was remarkably loquacious.†

* *Vide* pp. 28 and 32.

† It is well known that tumours of the brain, by their slow and gradual development, frequently compress, deform, and displace the cerebral tissue, without sensibly altering the function of that organ; and it has been suggested, that in these cases there may be a sort of unfolding of the brain tissue by the pressure of the tumour which has developed itself in its place, but not at the expense of the tissue itself, which, in its new relations, and under the form and volume to which it has been reduced, may still retain the integrity of its structure, and its habitual functional aptitude. A good illustration of this capacity of the brain to adapt itself to altered circum-

These three cases, to which I could add others, seem to upset M. Bouillaud's doctrine by showing that a profound lesion may exist in both anterior lobes, without impairment of articulate language; but on the other hand, it is only fair to observe that in none of them was there positive evidence of the complete destruction of the anterior lobes, for in M. Peter's case, although the lesion must have been extensive, still, as the words "*cornes frontales*" are used to describe the part injured, the posterior part of the same lobes may possibly have remained unaffected; again, in M. Trousseau's case it is possible to conceive that the transit of a ball through both anterior lobes may have left a portion of the cerebral substance uninjured; in reference to M. Velpeau's barber, in reading carefully the details of the autopsy as noted in the *Bulletins de l'Académie de Médecine*, I find it stated that a portion of the right anterior lobe was not involved in the tumour, also that at the posterior, external, and inferior part of the left lobe, there was a certain thickness of cerebral substance unimpaired.

The adversaries of the localisation of speech in the anterior lobes have attached an immense importance to a case mentioned by Cruveilhier of a congenital idiot, who could pronounce words distinctly articulated, although after death it was found that there was congenital absence of the two anterior lobes. This ob-

stances is furnished by Mr. Cadge's case which I have quoted at page 41, where a tumour of the size of a hen's egg had invaded a portion of the left anterior lobe, without giving rise to aphasia. I need scarcely add, that this explanation cannot apply to the cases I have quoted, in which integrity of speech coincided with tumours involving nearly the entire anterior lobe.

servation has such an important bearing upon our present inquiry, that an abridgment of it must find a place here.

Alexandrine Vaillosge, a congenital idiot, came under observation at the age of twelve—the idiocy being carried to the highest degree. She could neither dress nor feed herself; although she could move her limbs in all directions, she was unable to co-ordinate her movements for the act of walking, and it was necessary to carry her from place to place. The sense of smell seemed not to exist, or rather the young idiot was insensible to bad odours; the other senses presented nothing remarkable. If one threatened to strike her she would make the most frightful noises. The desire for food was readily felt, and when hungry she would express her wants by means of words *very distinctly articulated*. This girl having died at the age of fifteen of chronic diarrhœa, the following post-mortem appearances were observed:—The skull was very well formed exteriorly, but its cavity was not completely filled by the brain. The anterior lobes were entirely absent, and a limpid serum contained in the cavity of the arachnoid occupied the space which separated the anterior extremity of the brain from the frontal portion of the dura mater. Strange to say, the orbital plates, although not in contact with the brain but with serum, presented the mammillary eminences and digital impressions exactly similar to those of a healthy individual of the same age. With the exception of the absence of the anterior lobe, the left hemisphere completely filled the corresponding part of the skull; the right hemisphere, the size of which was only about half that of the left, was separated from the parietes of the skull by a space filled with serum.*

Cruveilhier himself seems to have considered this case as fatal to the doctrine of the localisation of speech in the anterior lobes; on examining, however, carefully the beautiful plate annexed to the description of it, it is evident that when the author stated that the two anterior lobes were wanting, he did not limit these lobes

* Cruveilhier, Anatomie Pathologique, 8e Livraison, pl. 6.

in the same way that we do now. For Cruveilhier, the anterior lobes were limited inferiorly to that part of the hemisphere which lies on the root of the orbit,* for a glance at the plate will show that only the anterior half of the left frontal lobe was destroyed, the transverse frontal convolution being preserved, as well as the posterior half of the 1st, 2nd, and 3rd frontal convolutions; although the disease in the right hemisphere was more extensive, the plate shows that a considerable portion of it still remained. According, therefore, to our present mode of dividing the brain, this case cannot be cited as impugning M. Bouillaud's theory.

An observation has been published by M. Aubertin, which at first sight might seem to lend a powerful support to M. Bouillaud's theory.

A man was one day brought to the hospital Saint Louis, who with the view of committing suicide, discharged the contents of a pistol into his forehead. On examination, it was found that the frontal bone was completely shot away; the anterior lobes were exposed, but not injured. Intelligence was unaffected, and speech was perfect. As the patient survived several hours, the opportunity was taken to make the following experiment upon him. Whilst he was talking, a large spatula was applied horizontally to the two anterior lobes, which it lightly compressed; speech was instantly suspended—*le mot commencé était coupé en deux*; the power of speech returned the moment the pressure was removed. It is further added that the pressure was made with so much care, that the general functions of the brain were in nowise affected by the experiment; the only faculty suspended was that of articulate language.†

* This limitation of the anterior lobe is correct only as far as the orbital convolutions are concerned, for a glance at the plate facing the title page of this treatise, will show that above the orbital portion, the anterior lobe extends very much further backwards.

† Gazette hebdomadaire, 1863, p. 351.

The above experiment, although of great scientific interest, can scarcely be said to prove the localisation of speech in the anterior lobes; for pressure made on the denuded surface of these lobes must necessarily have been transmitted to other parts of the brain.

I now pass to the consideration of the theory of M. Dax. The brain as a whole has hitherto been considered as a symmetrical organ, even by those who regarded it as an assemblage of lesser organs arranged in pairs with corresponding functions; M. Dax, however, assigns a function to the left hemisphere, which, according to him, is not shared by the right; for he places the lesion in aphasia solely in the left hemisphere, without however limiting it to any part of that hemisphere.*

This is a question that can only be settled by a careful statistical research. M. Broca estimated the proportion of aphasics with lesion in the right hemisphere as 1 in 20. In 1864, M. Vulpian tabulated all the cases bearing upon this question which came under his observation, at La Salpêtrière. They were twelve in number, and divided as follows:—Lesions of the left anterior lobe with aphasia, 5; lesions of the left anterior lobe without aphasia, 4; lesions of the right anterior

* Dr. Dax's conclusions were embodied in a communication to the medical congress held at Montpellier in the year 1836, the title of his paper being—*Lésions de la moitié gauche de l'encéphale coïncidant avec l'oubli des signes de la pensée*. In 1863 his son, Dr. G. Dax, presented a memoir to the Academy of Medicine of Paris, in which, whilst supporting the views of his father as to the seat of speech in the left hemisphere, he confined it to more narrow limits, namely, the anterior and external part of the middle lobe.

lobe without aphasia, 1 ; cases of aphasia without lesion of either anterior lobe, 2. It will be remembered that M. Dax's paper contained 140 observations confirmatory of his view. Notwithstanding numerous and well-authenticated exceptions, it must be conceded that in a vast majority of instances, loss of speech occurs in conjunction with right hemiplegia, a coincidence which may perhaps be explained on physiological grounds, as we shall see presently.

Dr. Dax's theory receives valuable support from such cases as that I have quoted as occurring in the Middlesex Hospital under Dr. Stewart, where the patient retained the power of speech after an attack of left hemiplegia, but became aphasic a few days later, on the occurrence of dextral paralysis. An analogous case has recently been published by M. Auguste Voisin, the leading features of which deserve a passing allusion, not only from its clinical importance, but from the scrupulous care with which the autopsy is described.

A female, aged 55, was under the care of M. Voisin, at La Salpêtrière, for left hemiplegia of four years' duration ; speech, as well as the intellectual powers, being unimpaired. One day she was suddenly seized with giddiness, followed by complete aphasia ; at the expiration of four days, the report states that there was no recovery of speech, but that the patient made herself understood by gesture. On the fifth day death ensued. Autopsy—The membranes are normal in appearance, and are easily removed without injury to the grey substance beneath. A large number of vessels contain calcareous plates. In the right hemisphere, the 1st, 2nd, and 3rd frontal convolutions are perfectly healthy, as also the island of Reil ; on opening the lateral ventricle from above, a pulpy softening is noticed of a pale yellow colour occupying the corpus striatum, without, however, involving its extra-ventricular nucleus, or extending to the grey and white substance adjoining the insula. In the left hemisphere, the 1st, 2nd, and 3rd frontal

convolutions present no alteration, but not so the island of Reil, in which there is a very superficial and circumscribed softening (de 8 ou 10 millimètres de diamètre), limited to the grey matter; the subjacent white matter, as well as the extra-ventricular nucleus of the left corpus striatum, being perfectly free from disease of any kind. The neighbouring vessels are more or less infiltrated with calcareous salts, and an artery of medium calibre, destined for the nutrition of the island of Reil, is entirely obstructed by a calcareous deposit. Several portions having been submitted to microscopic examination, the following appearances were observed; 1° A large number of corpuscles of Gluge of a reddish yellow colour; 2° some crystals of hematoidine disseminated here and there, also of a decidedly reddish yellow colour; 3° a considerable number of oil globules; 4° very irregular nerve-tubes; 5° blood vessels completely discoloured, and presenting some isolated colourless corpuscles.*

M. Voisin calls attention to the fact that the interest of the above case consists in the limitation of the lesion to the grey matter of the left island of Reil, also to the complete aphasia occurring in a woman, who, for four years, had been hemiplegic on the left side from softening of the right corpus striatum; he also observes that if his attention had not been called to the loss of speech, such a circumscribed lesion might well have escaped his notice; in which case, this necropsy would have swelled the number of those where no anatomical lesion could be found to explain the aphasia.

Thus the arguments in favour of M. Dax may be said to be of a positive and of a negative kind, and could we stop here, M. Dax's position might be said to be impregnable; but—audi alteram partem—there is another side to the picture, and the partisans of M. Dax must explain away certain exceptional cases, which it seems difficult to reconcile with the truth of his views.

* Gazette des Hôpitaux, Jan. 25th, 1868.

Several instances have been recorded in which serious disorganisation of the left anterior lobe coincided with perfect integrity of speech. I have already quoted such cases, and I can make but a cursory allusion to some others that have been brought under my notice.

M. Maximin Legrand has related the history of a man who was shot in the head during the Revolution of 1848, and whose speech was not in the least affected, although after death it was found that the left anterior lobe had been shattered by the discharge from a gun.* M. Béclard has published the case of a syphilitic patient whose speech remained unaffected to the last, although it was found that all the left hemisphere was reduced to a pulp.† One of the most uncompromising opponents of M. Dax's views is M. Lelut, whose report on M. Dax's paper gave rise to the prolonged discussion on this subject at the Academy of Medicine of Paris. After inveighing in general terms against all cerebral localisation, M. Lelut reminded the academy of a case he had published thirty years ago, of an epileptic who retained his speech in its integrity to the last moment, although his entire left hemisphere was completely disorganised.‡

* Dictionnaire Encyclopédique des Sciences Médicales, Article "Aphasie," par Jules Falret, p. 628.

† *Ibid*, p. 628.

‡ I give the leading features of this case in M. Lelut's own words. It affords another illustration of the manner in which cases are distorted to suit particular theories, for on referring to the original description as it appeared in the *Journal Hebdomadaire de Médecine*, it seems that instead of complete disorganisation of the left hemisphere, the lesion was limited to the posterior and middle lobes, and the report goes on to say that "the anterior lobes were very well developed, and their convolutions had the usual proportions." In reference to the question we are now considering, this is, doubtless, not the only instance in which a clinical obser-

tively "Hysterical Lethargy," and the "Cataleptic State." It is reported that most cases of grave hysteria, can be thrown into the first of these two conditions by directing the eyes to be fixed steadily on some point—the tip of a penholder held in the hand, for instance; in a few moments, the head inclines to the right or to the left, the eyelids close, the limbs become motionless and limp, the tendon reflexes are greatly exaggerated, and there is a marked neuromuscular hyperexcitability, a phenomenon first observed by M. Charcot, and which he designated *hyperexcitabilité neuromusculaire des hypnotiques*, and which consists of the aptitudes which voluntary muscles acquire to contract under the irritation of simple mechanical irritation; the power of speaking, however, remains. This is the condition of hysterical lethargy.

It is easy to cause the patient to pass from the hypnotic condition to the cataleptic stage. All that is required is to open the eyelids and allow the retinae to be stimulated by the rays of light; the patient immediately becomes cataleptic, but a remarkable difference is observed between the two sides, as shown by the following experiment made by M. Lepine, one of M. Charcot's assistants.

A female patient is hypnotised; if asked to speak, write, or make any gesture, whilst in this condition, she obeys. The left eyelid is then opened and the left retina stimulated, thus plunging the right hemisphere into a state of catalepsy; there is no change from a linguistic point of view, the patient continues to speak, to write, and to gesticulate. The process is modified; the left eyelid is closed and the right opened with corresponding stimulation of the right retina, thus plunging the left hemisphere into a state of catalepsy; immediately all communication with the external world is suppressed, the patient can neither speak, write, nor gesticulate.

“Le masque facial reste muet.” A moment before, when the right hemisphere was in a cataleptic condition, every form of language subsisted; now that a similar condition is induced in the left hemisphere, language of every kind is abolished.

The above experiment was repeated in the case of another patient who knew by heart some pieces of poetry. Whilst in the hypnotic state, she repeated certain verses distinctly. The left eyelid was raised, but she continued her recitation; but on the left lid being closed and the right opened, thus producing catalepsy in the left hemisphere, she straightway ceased to speak in the middle of a verse, sometimes even in the middle of a word. On closing the right eyelid, she began her recitation again, at the very place at which she left off, recommencing sometimes in the middle of a word!*

M. Ballet in commenting upon the above curious phenomena, lays great stress upon their value as experiments *in vivo*, tending to confirm the results of clinical observation, which would place the seat of speech in the left anterior lobe to the exclusion of the right. But are the deductions drawn from these experiments not open to doubt? I think they are; at all events, they are certainly not beyond the reach of fair and legitimate criticism.

In the first place, although the results claimed for them are so startling, and of such momentous importance, I am not aware that they have even been confirmed by subsequent observers. I find that my scepticism is shared by no less an authority than Professor Bernheim of Nancy, who, in a private communication to me, attributes the phenomena observed to “suggestion.” “It has been thought,” says he, “at La Salpêtrière, that the hypnotised, whilst in a state of lethargy, are unconscious

* Nouveau fait à l'appui de la localisation de Broca, par G. Ballet. “*Progrès Médical*,” Sep. 11th, 1880, p. 78.

and do not hear; whereas they hear everything, and often strive to guess what the observer is desirous of eliciting from them. A hypnotised person who has never witnessed Charcot's experiments, and who is not aware of what is desired of her, will certainly never exhibit the phenomena described. It is entirely an affair of *suggestion*; the experiments are misleading, and can in nowise help to solve the difficult questions connected with the pathology of aphasia."

My friend, Dr. Hack Tuke, whose researches upon this subject are so well-known, has favoured me with a letter in reply to my inquiry, in which he says that he has never been able to convince himself that hypnotic experiments, which appear to support the alleged function of Broca's convolution, are free from that subtle and constant source of fallacy—unintentional suggestion. In an article on "Artificial Insanity" in the *Journal of Mental Science* for 1865, and also in his "Influence of the Mind upon the Body, with especial reference to the imagination" (1872), Dr. Tuke has insisted on the numerous influences of imagination and suggestion in so-called animal magnetism and hypnotism.*

* In his more recent work on "Sleep-walking and Hypnotism," Dr. Tuke, in describing the characteristics of the mental condition in hypnotism, dwells upon the extreme susceptibility to outside suggestions as being most surprising. "The individuality of the hypnotic subject being deleted for the time, he represents the logical consequence of the organisation of men in society who are practically will-less, who are at the mercy of every suggestion, however absurd, and every crotchet, however wild and unpractical. This ideoplastic state finds its analogue also among the actually insane, the tyrant of their organisation—that which tyrannises over their thoughts and lives—being some fixed idea or a disordered perceptive centre, or in the absence of these, the unwholesome susceptibility to the influence

Furthermore, whilst engaged in writing this section, my attention has been called to a report of a curious illustration of the effects of hypnotic suggestion, lately witnessed at St. James' Hall, London. It is stated that a mesmerist threw a gentleman named King into a mesmeric trance so profound, that the passage of a needle through the fleshy part of his arm caused no sensation. In this state, Mr. King gave humorous lectures and very curious imitations of Mr. Gladstone, Mr. Irving, Mr. Grossmith, and Dr. Parker. He was told by the mesmerist that he was each and all of these persons, and quite unconsciously he accepted the responsibility.

Moreover, Professor Charcot himself, as I have elsewhere stated, admits that hysterical mutism can be produced artificially by hypnotism; and in the appendix to the third volume of his "Diseases of the Nervous System," one of his pupils, M. Cartaz, thus describes in detail how by hypnotic suggestion, hysterical mutism is produced. During the period of somnambulism, the patient is made to converse; the observer then lowering his voice, says to her, "I don't understand you. What

of others, as in the case of the unstable hysterical girl who adores every curate she meets with, and would willingly do anything he tells her to do!"

Dr. Tuke then illustrates his views, by a detailed account of the clinical history of a young girl, a patient at Guy's Hospital under the care of Dr. Wilks, in whom the effects of *suggestion*, when in a hypnotised condition, were very striking; in fact, she was made to do almost whatever was suggested. She could be rendered stone deaf, on being told that she could not hear; but the moment the observer said to her, "Now you can hear," she was released from the spell. On the idea being suggested to her that her hands were being cut off, nothing could induce her to use her fingers; the will was the slave of a suggestion, an automaton was substituted for the true volitional self.

do you say? Why, you can't speak." And in an instant the patient is aphasic, being unable to speak or to phonate. This, says M. Cartaz, is the exact representation of the mental disturbance observed in hysterical patients.

Whilst, therefore, recognising the scientific interest attaching to these curious experiments, I cannot admit that the inference that has been drawn from them is a logical one; and I think they should not be cited as confirmatory of the localisation of speech in the left hemisphere of the brain.

I am not at all sure that there may not also be an anatomical objection to the deductions which have been drawn from these experiments.

In a former chapter, I have entered at some length into the consideration of the different theories of the visual centre, and I have shown that the whole subject is far from being definitely settled, as the most divergent notions exist as to the course of the fibres at the chiasma, between it and the mesocephalic ganglia, and again between these and the cerebral cortex. Moreover, Charcot's assumption that there is a supplementary crossing of the fibres of the optic tracts in the corpora quadrigemina, by which all fibres from one retina would pass to the opposite hemisphere, is by no means recognised as absolutely correct; indeed, Charcot himself speaks of it only as a hypothesis not based, at present, on any anatomical grounds, but, nevertheless, supplying a ready means of presenting, in a very simple form, the rather complex facts revealed by clinical observation!

I need scarcely point out, that if there be no other decussation of the optic fibres but that which is said to take place at the chiasma, stimulation of one retina

should affect both hemispheres equally, and the Salpêtrière experiments would lose all their import—that is assuming that the prevailing opinion is correct, that the crossing of the fibres at this point is only partial. I am aware that this partial decussation is not admitted by all anatomists, and that the course of the optic fibres is still a matter of dispute; in fact, certain German anatomists, Biesiadecki, Mandelstamm, and Michel, maintain that the fibres of the optic nerves undergo complete decussation at the chiasma, as occurs in fishes, amphibia, reptiles, and birds; and Charcot himself admits that the question is far from being settled, and that the semi-decussation is to be looked upon simply as a theory which, however, explains the facts observed in clinical medicine. I find that Ferrier also, in describing Charcot's scheme, characterises it as unsatisfactory, and in contradiction with now well-established clinical, as well as experimental facts;* it is therefore clear that the exact course of the fibres of the optic nerves is still undefined; and perhaps no question of late years has excited so much controversial discussion as the exact determination of the visual centre.

The whole subject of the course of the fibres of the optic tract, and of the nervous connections which exist between the retina and the brain, is discussed in an exhaustive manner by Professor Grasset, of Montpellier, who rejects the schemes both of Charcot and of his pupil Féré, for which he substitutes one of his own, frankly admitting, however, that it is purely hypothetical, but may be useful as a means of graphically representing the actual state of our knowledge of this difficult subject

* Functions of the Brain, 2nd edition, p. 289.

of cerebral semeiology;* M. Grasset recognises three decussations of the optic fibres!

1° Semi-decussation at the chiasma, where the internal fibres cross, whilst the external fibres continue in a direct course.

2° The external fibres cross in the neighbourhood of the corpora quadrigemina, so that by this arrangement the decussation is complete; and thus all the optic fibres from one eye are re-united in the internal capsule of the opposite hemisphere.

3° The external fibres undergo a further decussation beyond the internal capsule, before terminating in the convolutions of the hemisphere; and by this means each occipital lobe will contain the external fibres from the eye of the same side, and the internal fibres from the opposite eye.

M. Grasset adds that this triple seat of partial decussation seems to be indispensable for the proper interpretation of certain clinical facts; as to the exact locality in which it occurs, he suggests that it may be in the corpus callosum. He admits that the above arrangement is somewhat complex, but that the facts to be explained are of a no less complex character also.

Another author, Michael Foster, in writing upon this subject, says that the nervous centre is not a double centre with two completely independent halves, one for each eye; there is a certain amount of communion between the two sides, so that when one retina is stimulated both pupils contract.† The authors of the *Salpêtrière* experiments of course assume that one retina only is stimulated, and only one hemisphere plunged into catalepsy.

* *Traité pratique des maladies du Système Nerveux*, pp. 261—269.

† *Text Book of Physiology*, 4th Edition, p. 501.

Besides the conflicting opinions as to the points of decussation of the optic nerves, there would seem to be a further objection to the acceptance of the inference drawn from the Salpêtrière experiments in reference to the localisation of the faculty of speech. In order to establish any connection between these experiments and the localisation of speech, it is necessary to assume that the fibres of the optic tract find their way into the anterior lobes of the brain—the supposed seat of speech—which is by no means universally admitted.

The course of the fibres of the optic tract between the external geniculate body and the cortex of the brain is not well ascertained, and is still the subject of scientific inquiry; at all events, a great diversity of opinion exists in reference to it. Gratiolet asserted that the optic tract is directly connected with every part of the cerebral hemisphere in man, from the frontal to the occipital region; and Professor Hamilton of Aberdeen, in a communication to the Royal Society on "The Cortical connections of the Optic Nerves," expressed the same opinion.*

In treating of this subject, that careful and accurate observer, Dr. Ross, says that both anatomical and physiological, as well as pathological observations, make it certain that most, if not all, of the fibres of the optic tracts terminate in the cortex of the occipital lobes; but that the course of the fibres in the intervening space between the cortex and the external geniculate body, is the subject which has excited the greatest controversy.†

Dr. Gowers, in a private communication with which

* Proceedings of the Royal Society, No. 232, 1884.

† Diseases of the Nervous System, 2nd Edition, Vol. i., p. 385.

he has favoured me, expresses himself very decidedly upon the point in question; and his views of the physiology of the cortex would exclude altogether the idea of any passage of fibres from the optic tract to the motor speech region.

I have thought it desirable thus to enter at great length into the consideration of the bearing the experiments made at La Salpêtrière upon persons in a state of hypnotism, may have upon the subject I am treating; but I must think that our knowledge of the exact construction of the visual centre, of the precise distribution of the fibres of the optic tract, and of the relation of the two visual centres to each other, is at present so imperfect as not to justify the originators of the above interesting experiments to quote them as evidence of the localisation of speech in the left hemisphere of the brain.

I now arrive at the consideration of the views of M. Broca, whose researches lead him to confine the seat of speech to a very narrow limit—the posterior part of the third frontal convolution of the left hemisphere!

However startling this assertion may be, a considerable number of observations have been recorded, which, at first sight, would seem to substantiate it; and in the previous pages I have quoted several cases published by careful observers, which give a general support to this exclusive doctrine. Perhaps one of the most striking observations that have been cited in support of M. Broca's localisation is that of Simon, which I have recorded *in extenso* at page 259; the subject of it fell from his horse on his head, and suddenly became speechless, with no motor paralysis of any kind; after death, a spiculum of bone which had become detached from the inner

table of the left parietal bone, was found embedded in the left frontal convolution. Another observation by Rosenstein is equally significant, showing that a hæmorrhagic softening, only as large as a hazel-nut, in the left third frontal convolution, can give rise to aphasia and agraphia as the only symptoms.*

M. Magnan also presented to the Société de Biologie, in Paris, the brain of a woman who had for some time suffered from aphasia; the brain contained a large glioma of the dura mater which had penetrated deeply into the third left frontal convolution. At first sight this case which was quoted in the English press, would seem to lend a powerful support to Broca's theory; but having some doubts about its value, I consulted the Transactions of the Société de Biologie, and there I find that the tumour (of which a plate is given) had encroached upon various other structures besides the third frontal convolution, as will be seen from the following extract from the original communication:—

“Reposant par sa base sur la face interne de la dure-mère, son sommet plonge profondément dans l'hémisphère gauche qu'elle a creusé et refoulé au niveau de la moitié postérieure des deux premières frontales et des deux tiers supérieurs de la frontale ascendante. De cette moitié des deux frontales, on ne distingue plus que le pied, qui s'insère sur la frontale ascendante et qui est presque complètement effacé. La tumeur pénétrant à la façon d'un coin dans l'hémisphère gauche, écarte et refoule toutes les parties voisines, et son sommet pénètre jusqu'à la hauteur de la troisième frontale gauche et du tiers antérieur du bord supérieur de l'insula. Retirée de sa cavité, la tumeur mesure par son côté oblique 7 centimètres et 4 centimètres seulement du côté opposé qui est droit.”

I have thought it best to give the above description of the morbid appearances in M. Magnan's own words, by

* Berl. klin. Wochenschrift, 1871, s. 599.

which it will be seen that from the size of the tumour and the pressure exercised by it on various structures all around, this case is utterly valueless as evidence in favour of localisation; and it shows how clinical observations, unless minutely analysed, are liable to be misinterpreted, and made to fit in with preconceived theories, upon which they really have no bearing.

In the same communication, M. Magnan gives the clinical details of three other cases of aphasia, in which the third frontal convolution was found to be diseased; in all three instances, however, the island of Reil participated in the lesion to a considerable extent, and he adds that the coincidence of lesions of the insula and of the third frontal convolution is very frequent in aphasia, and, moreover, that in some instances the disease is but slightly apparent in the third frontal, but strikingly marked in the insula; furthermore, that in some cases, the disease is entirely limited to the latter, the former being quite healthy.

Let us now weigh in the balance of impartial criticism the case which has served as the foundation stone upon which M. Broca has erected his theory. I allude, of course, to the case of Tan, the details of which I have already given. This observation has been quoted by writers in all parts of the world as a case of aphasia from lesion of the third left frontal convolution; indeed, it was the very case which resulted in the conversion of its author to the unilateral theory. Now, on referring to the description I have given of Tan's autopsy, it will be seen that, in addition to the disease in the second and third left frontal convolutions, upon which M. Broca lays such stress, the following morbid conditions were also observed:—Thickening of the cranium and of the dura

mater, universal infiltration of the pia mater with yellowish plastic matter of the colour of pus. The greater part of the left frontal lobe was softened, and a cavity of the size of a hen's egg was caused by the destruction of the inferior marginal convolution of the temporo-sphenoidal lobe, the convolutions of the island of Reil, and the subjacent part or extraventricular nucleus of the corpus striatum. It will also be observed that the weight of the encephalon was less by 14 ounces than the average weight of the brain in men of fifty years of age. As the softening, instead of being limited to Broca's region, involved the greater part of the left frontal lobe, surely it implies a breach of the laws of probability, to assume that the disease commenced in the third frontal convolution *21 years before his death*, simply because the softening was most apparent at that spot, which M. Broca considers was the primary seat of mischief at the period of the clinical history during which the faculty of speech alone was abolished.

It will be observed that Broca's theory implies that aphasia is *always* and *only* present when the third left frontal convolution is diseased; now two classes of observations have been advanced against this position:—1° those in which aphasia occurred with complete integrity of the third left frontal convolution; 2° those in which there was found positive lesion of this convolution without disturbance of speech.

In the first category may be mentioned the various cases that I have quoted from the works of Charcot, Vulpian, Trousseau, and others; of those that are recorded as having fallen under my own personal observation, a careful autopsy was made in five instances, when the frontal convolutions were in each case invariably found

to be healthy. Wishing to avoid useless repetition, I will refer my readers to the fourth chapter of this treatise, where the clinical history of my own cases, as well as the post-mortem appearances, are detailed at considerable length. The history of William Sainty (see page 100) is especially interesting; it was a typical case of aphasia, was under close observation for several years, and after death there was found softening of the middle of the posterior lobes, with no trace of disease in the frontal convolutions.

The advocates of M. Broca's views will charitably say that there may have been some slight disease of the frontal convolutions not patent to my means of investigation. This is an objection that may be raised against all negative cases; but granted that there may have been some slight change in the texture of the third left frontal convolution not appreciable to my senses, the whole history of this case points to the certain conclusion, that the *fons et origo mali* was in the posterior lobes, and here must have been the commencement of disease, when, four years before his death, the first and only morbid symptom showed itself in the total suspension of the faculty of articulate language.

The second category of cases at variance with Broca's views, embraces those where a positive lesion of the third left frontal convolution existed without aphasia. It was formerly stated by M. Broca, and repeated by M. Jules Falret and Dr. Wm. Ogle, that there was no example of this condition; it will, however, be remembered that I have quoted such a case at page 67, as reported by Dr. Simpson of the Gloucester Asylum. Dr. Long Fox, of Bristol, has observed a case of syphilitic disease of the left frontal convolution involving Broca's

region, the power of speech being unimpaired;* and Mr. Messenger Bradley has reported a case in which there was no aphasia, although the third left frontal convolution was as thoroughly destroyed as if ablation had been performed.† A goodly number of similar instances have been recorded of disease of this gyrus without aphasia, the most striking of which is that observed by Dr. Fonlis of Glasgow, where the patient could talk with perfect fluency and correctness, although the third left frontal convolution was found completely destroyed with the exception of a thin shred at the extreme posterior end; the island of Reil was also to a large extent excavated.‡

Furthermore, M. Moreau (de Tours) has observed at La Salpêtrière a case of *congenital absence of the third left frontal convolution*, as well as of the inferior parietal and the superior temporo-sphenoidal convolutions on the same side—or, in other words, all that part of the left hemisphere which bounds the fissure of Sylvius, and which is known in M. Foville's nomenclature as *la circonvolution d'enceinte de la fissure de Sylvius*, had never become developed. Now, if the third left frontal convolution, or even its immediate neighbourhood, were the exclusive seat of speech, this patient ought to have been aphasic, which, it is stated, was not the case.§

* Lond. Hosp. Reports, vol. iv., p. 350.

† Brit. Med. Journal, June, 1873.

‡ For a full description of this important observation, vide page 77.

§ M. Broca, in referring to this case, the importance and significance of which he fully admits, says, that when the third left frontal convolution—the ordinary seat of articulate language—is congenitally deficient, the individual learns to speak with the third right frontal convolution, just in the same way as a child born without the right hand, becomes as skilful with the left, as others are with the right hand.

M. Legroux, in commenting upon observations of this description, says

It will thus be seen that we can have aphasia without disease of the third left frontal convolution, and vice versa; that this gyrus may be diseased, destroyed, and even congenitally absent, without giving rise to any disturbance of speech.

Since the publication of M. Broca's pamphlets, the attention of the profession in all parts of the world has been directed to the question of the cerebral localisation of speech, and evidence of the most conflicting character has been accumulating in reference to the various theories of localisation that I have been discussing.

Some interesting and important statistics have been published by Lohmeyer. This observer has collected 53 carefully described cases of aphasia, in which an autopsy was made. In 50 of these cases, the loss of speech depended upon a lesion of the left hemisphere, the lesion being 24 times in the third frontal convolution; 34 times in it and its neighbouring parts, including the island of Reil, which was 7 times concurrently affected; 13 times in the left island; 6 times in this alone.*

On reviewing the evidence contained in the preceding pages, as far as it bears on the question of localisation, it will be seen that a certain number of cases have been recorded that are at variance with all the different theories that I have been considering. Incontestable and patent lesions have been observed in the different

that they ought not to be considered as antagonistic to M. Broca's views, with which they can be reconciled by the assumption that the right hemisphere may, under exceptional circumstances, be able to assume the function ordinarily belonging to the left. *De l'aphasie, Thèse pour l'agrégation, 1875, p. 42.*

* *Archiv. f. klin Chirurgie, 1872, xiii., s. 309.*

regions where it has been attempted to localise speech, and such lesions have not been accompanied by any derangement of that faculty; and I need scarcely remark that a well established case of destruction of both anterior lobes without lesion of speech would be fatal to both Bouillaud's and Dax's views, and would *a fortiori* upset Broca's theory also. Although many such cases have been recorded, critics have urged that there may have been, and probably were, some small portions of the lobes left, or at all events, that the third left frontal convolution may have escaped. To this reasoning, I would reply that, as far as function is concerned, isolation would be identical with complete destruction. On the other hand, evident cases of aphasia have been recorded which coincided with no alteration whatever of those parts of the encephalon to which the seat of speech has been assigned.

No subject of late years has so occupied the attention of physiologists in all parts of the world, as the attempt to localise the grand attribute of humanity, the faculty of speech; but, I am bound to say that in spite of all that has been written in reference to it, the question must still be considered as *sub judice*, and an impartial sifting of the mass of evidence I have accumulated has led me to the following conclusions:—

1°. That although something may be said in favour of each of the popular theories of the localisation of speech, still, so many exceptions to each of them have been recorded, that they will none of them bear the test of a disinterested and impartial scrutiny.

2° That aphasia certainly is not invariably connected with lesion of the left anterior lobe of the brain.

3° That the converse of this is not true also—namely,

that when a positive lesion of the left anterior lobe exists, aphasia is necessarily one of the symptoms ; moreover, medical literature contains numerous instances of extensive lesions of *both* anterior lobes without serious impairment of speech, and cases of this description, recorded by competent observers, must be taken into serious account in settling the question of localisation ; they must be faced by the localisers, and their significance cannot be ignored.

4°. That it must, however, be conceded that in the immense majority of cases, aphasia has been found associated with disease in the left anterior lobe, and more especially in the third left frontal convolution or its immediate neighbourhood ; and the concurrence of derangements of speech with lesions of this limited area is so strikingly frequent, as to take it altogether out of the region of mere chance.

I, however, agree with Professor Grasset, of Montpellier,* that the seat of articulate language (if there be one) is not a 'mathematical point' which can be definitely circumscribed ; for although in a large number of cases loss of speech corresponds with a lesion of the third left frontal convolution, the island of Reil is frequently simultaneously affected, and in some rare instances, this region has been found to be alone diseased.

The question of the localisation of cerebral faculties has not been confined to physiologists, but has excited a

* *Traité pratique des maladies du Système Nerveux*, p. 172. In this very elaborate and exhaustive treatise, as well as in his work on "*Les Localisations Cérébrales*," M. Grasset has entered most fully into the controversial aspect of the pathology of aphasia. Both these treatises have been most serviceable to me, and are well worthy of careful study for their sound anatomical knowledge, their wealth of illustration, and their felicity of expression.

good deal of interest in the literary world generally ; and it is curious to notice how some non-medical writers have expressed themselves with a dogmatic precision not justified by the evidence at their command.

Herbert Spencer, after stating that most physiologists have not sufficiently recognised the general truth of which phrenology is an adumbration, goes on to say that 'whoever calmly considers the question, cannot long resist the conviction that different parts of the cerebrum must, in some way or other, subserve different kinds of mental action. Localisation of function is the law of all organisation whatever ; and it would be marvellous were there here an exception. . . . It is proved, experimentally, that every bundle of nerve-fibres and every ganglion has a special duty ; and that each part of every such bundle and every such ganglion has a duty still more special. Can it be, then, that in the great hemispherical ganglia alone, this specialisation of duty does not hold ? . . . Just as there are aggregated together in a sciatic nerve an immense number of fibres, each of which has a particular office referring to some one part of the leg, but all of which have for their joint duty the management of the leg as a whole ; so, in any one region of the cerebrum, each fibre may be concluded to have some particular office, which, in common with the particular offices of many neighbouring fibres, is merged in some general office fulfilled by that region of the cerebrum. Any other hypothesis seems to me, on the face of it, untenable.'*

Another writer, Mr. G. J. Romanes, in his recent work on "Mental Evolution in Man,"† trenches the question in

* The Principles of Psychology, vol. i., 2nd edition, p. 573.

† This work may be consulted with advantage by the student of linguistic

a very decided manner, remarking that the evidence available has fully satisfied all living physiologists that the faculty of articulate language has a *material locus habitandi*; and he insists upon the propriety of the expression "Seat of Speech." We shall see presently whether the views of living physiologists on the subject harmonise as completely as Mr. Romanes so confidently asserts. As Mr. Romanes' views upon this subject are contained in a very courteous and temperate criticism of my treatise on "Darwinism tested by Language," I must refer him to the 7th chapter of that work, where certain arguments are used with which he does not seem to be familiar.

The question of cerebral localisation formed a prominent feature of the Congress of American Physicians and Surgeons held at Washington in September, 1888, at which several of the leading American neurologists expressed their views upon this much disputed point. The subject was introduced by Dr. Charles K. Mills, of Philadelphia, in an exhaustive essay upon the various points in dispute; the doctrines of cerebral localisation and the principles of cerebral symmetry were lucidly expounded by Dr. Mills and Dr. Park, Professor of Surgery in the University of Buffalo; the former dwelling chiefly on cerebral localisation in its practical relations, and the latter on the Surgery of the Brain as based on the principles of cerebral localisation. Dr. Allen Starr, of New York, then followed with an elaborate essay on Aphasia, which gave rise to a lengthened discussion, in

science, as its author devotes four chapters to the consideration of the different forms of language, employing the word in the wide sense in which Broca used it—the faculty of establishing a constant relation between an idea and a sign.

which Dr. Ferrier and Mr. Victor Horsley of London, Dr. Keen of Philadelphia, and Dr. Weir of New York, took part.

Dr. Starr, after stating that there is a consensus of opinion, based upon a large number of cases, that motor aphasia is produced by lesion of Broca's convolution, qualified this statement by adding that 'Broca's centre is connected with the cranial nerve nuclei by a nerve tract which transmits the impulses that start the speech mechanisms; and lesions in this tract appear to cause as true a motor aphasia as lesions at its origin. The differentiation between cortical and subcortical lesions meets us here at once. The only method of diagnosis is the study of collateral symptoms accompanying the aphasia, and the study of the history of the case which may settle the nature of the lesion, and thus aid to its localisation. If that lesion is just beneath the cortex, it cannot be distinguished from a lesion of the cortex. If it is in the speech tract as far from the cortex as the internal capsule where it will not injure the commissural fibres between the two lobes, the aphasia will be only temporary; the impulses are there supposed to cross from Broca's centre to the other hemisphere, and thence go down to the nuclei; and in this case, other symptoms of capsular or basilar lesion will be present to indicate the site of the disease. This distinction is important, for while Broca's centre is easily accessible to the surgeon, as one of Macewen's cases proves, the time has not yet come when he can reach the internal capsule.'*

* Transactions of the American Congress, p. 333. Dr. Starr's communication was illustrated by a diagram of 44 cases of word-blindness and of word-deafness; in it, the lateral surface of the brain, as shown by Ecker, is divided into squares; when, in a given case, the area indicated by

Considerations of space prevent me from dwelling further upon this most interesting and instructive congress; I must, however, make a passing allusion to the remarks of Mr. Victor Horsley, as being pertinent to the subject that I am considering in this chapter. Mr. Horsley, who expressed his views at great length, after speaking of the motor centres generally, said that the result of his experiments was to show that 'there is *no hard and fast line* limiting the representation of any given segment—that there is no area of the cortex, over which any particular segment is equally represented throughout, but that in one spot especially the representation is concentrated and thence diminishes gradually.'

Professor Hammond of New York, whose researches upon this subject are so well known, says in his second edition, that after giving full consideration to the facts and arguments which have been urged on all sides, whilst rejecting the restricted location of Dax, and the

one of these squares was invaded by the disease, the number of that case is put down in the square. Without wishing to criticise Dr. Starr's interesting diagram, I must point out that the first case on his list, which is one that he has done me the honour to quote from the first edition of this work, as an instance of word-blindness, presents none of the features of that singular affection, as will be seen by a reference to the clinical history as reported at page 109 of the present edition. In commenting upon his diagram, Dr. Starr adds that 'the great preponderance of numbers in the temporal and lower parietal regions, shows that this site is the seat of lesion in the large majority of cases of Sensorial Aphasia. Some of the cases presented extensive lesions outside of the speech area, as well as in it; but in none was Broca's centre destroyed or invaded by disease. . . . In all speech processes, an association of various memory pictures is constantly going on. Certain recent advances in the knowledge of aphasia give us indications sufficiently definite to be of practical use; for though we have to admit several speech areas instead of one speech centre, there is no reason why motor, or sensory, or mixed aphasia should not be taken as guides to operation as reliable and satisfactory as monospasm or hemianopsia.'

still more limited situation contended for by Broca, he is constrained to believe that the organ of language is situated in both hemispheres, and in that part which is nourished by the middle cerebral artery. As I have not access to his last edition, I do not know how far recent investigations may have modified Dr. Hammond's views, but in a letter received from him quite recently, he says, 'I am not so thorough going a localiser of the organ of speech as are Grasset and others; the speech-tract is for me quite a large region.'

Professor Ladd of Yale College, U.S., in his "Elements of Physiological Psychology," in refusing to limit too narrowly the localisation of such a complex faculty as speech, says: 'The literal meaning of the statements made by Broca—such as that this part of the brain is the seat of articulate language, is not simply inappropriate to the facts, it is even absurd. There is no one faculty of language which can, in any possible meaning of the word, be regarded as having its *seat* or locality confined to some particular region of the brain. Speech involves, in a very complicated and large way, all the faculties. Strictly speaking, then, it cannot be located, with all its attendant operations of self-conscious, rational mind, in any one cerebral area.'

Professor Huguenin says that the question of the localisation of speech is one which especially requires reserve in judgment, for the physiological value of what we know concerning the localisation of aphasic disturbances has been considerably over-estimated; especially when one stubbornly insists, as some do, that it is connected with Broca's convolution.* Professor Goltz, of

* Ziemssen's Cyclopædia, vol. xii., p. 789.

Strassburg, also, whose physiological researches have recently attracted so much attention, expresses a very decided opinion as to the non-existence of a limited centre for speech in the brain.

Amongst those who object to the mapping out with mathematical exactitude the functional topography of the cortex is Professor Brown-Séquard, who in a recent letter with which he has favoured me, says: 'I deny that there is any circumscribed part of the brain specially endowed with the power of expressing ideas by speech, but nervous elements which possess that function are scattered through a great many parts of the brain. Aphasia, whether coming from a lesion of the third frontal convolution, or from any other part of the brain, is due not to the destruction of a few cells endowed with the faculty of speech, but to an irritation starting from the seat of the lesion, and going to all the cells having that function, and which are scattered through the brain, stopping the activity of nerve elements by an act of Inhibition.*'

After duly weighing the conflicting evidence contained in the preceding pages, I think the Scotch verdict of "Not proven" may fairly be claimed in reference to any arbitrary and definite localisation of the faculty of speech; and the most that can be conceded is that the healthy action of a limited portion of the left hemisphere

* Dr. Ball, the Professor of Mental Pathology in the Faculty of Medicine of Paris, has communicated to me his views upon this subject in the following terms:—"The brain is not, as modern localisers would have it to be, a piano, each key corresponding to a particular note; but it may rather be compared to a violin, on which a skilful artist can play almost any tune upon one single string, when the other strings are cut—a feat actually performed by Paganini."

seems to be necessary for the *outward* manifestation of articulate language; but this fact does not justify crediting this area with being the *Seat of Speech*—an expression which seems to me to be inappropriate and misleading. I cannot do better than conclude this chapter with a quotation from the classical work of Professor Küssmaul, whose views I find are in consonance with my own. “For the purposes of speech, there exists an apparatus as vast as it is complicated. A simple *centre of language* or *Seat of Speech* does not exist in the brain, any more than a *seat of the soul* exists in a single centre. The central organ of speech may be said to be composed of a large number of ganglionic apparatuses, widely separated from each other; but connected by numerous tracts, and fulfilling certain intellectual, sensory, and motor functions; but it is probable that none of these apparatuses subserve alone the objects of speech.”*

* Die Störungen der Sprache, cap. ix., s. 32.

CHAPTER XII.

Consideration of certain collateral subjects indirectly connected with the Localisation of Speech. The minute Anatomy of the brain. Cerebral asymmetry and its relation to criminality—the reduplication of the second frontal convolution said to be common in murderers. The science of Criminal Anthropology—its literature; psychical anæsthesia. Great development of the third frontal convolution in orators—the brain of Gambetta. Physiology—dextral pre-eminence; why is the human race right-handed? Experimental Pathology—differences between the brain of man and that of animals. General Anthropology—the cranial researches of Barnard Davis, Broca, Flower, and the Abbé Frère. Has the cranial capacity of the population been increasing in proportion to the progress of civilisation? Herodotus on the influence of head coverings on the thickness of the skull. The Chemistry of the brain—Thudicum on the phosphorised principles and the cerebromides. The phosphorus theory considered—views of Couerbe and Feurbach. Conclusion.

IT will be observed that I have hitherto considered this question solely from a pathological stand-point; but it seems to me that the anatomist, the physiologist, the comparative anatomist, and the anthropologist, can do us good service; and that it is to their researches, perhaps even more than to those of the clinical physician, that we are to look for the removal of the cloud which now envelops the obscure subject of the localisation of the faculty of speech.

In this concluding chapter, I have considered at much greater length than in my first edition, certain collateral matters which may be said to have only an indirect bearing upon my subject, but which, however, may help

the solution of certain difficulties connected with the study of the localisation of our cerebral faculties.*

ANATOMY.—Let me first consider whether the study of the minute anatomy of the brain, and especially of the cerebral convolutions, can help the question of the localisation of the faculty of speech.

This is a subject entirely neglected by the older anatomists; in fact, Cabanis, the author of a classical work on the revolutions of medicine, in the beginning of the present century, pronounced the minute anatomy of the brain as not only badly capable of being ascertained by the scalpel or the microscope, but as ‘rather an object of physiological curiosity than of medical utility, and at present wholly useless and likely to remain so.’ Thanks to the brilliant researches of modern anatomists, the cerebral cortex is no longer a *terra incognita*; and although much remains still to be done, it has been ascertained that considerable variations exist in different parts of the brain, in the number, character, and relative thickness of the layers, and their precise division has been the subject of much discussion; it has moreover been shown that there is a marked difference in the structure and general character of the cortex, especially in the central convolutions (ascending frontal, ascending parietal, and paracentral lobule).

We may fairly assume that difference of structure implies difference in function; it is important, therefore,

* I may add that I have been induced to develop at greater length this portion of my treatise, in deference to the wishes of the writer of a long and far too complimentary notice of my first edition in one of the leading medical periodicals, in which the reviewer suggested that this section of my work might with advantage be considerably enlarged.

to ascertain whether the generally assumed symmetry of the two hemispheres is correct. There cannot be a doubt that in general form the two opposite sides of the brain are alike, or at all events, resemble each other so closely, that no essential difference can be appreciated by the naked eye—the two hemispheres being apparently so nearly symmetrical and identical in structure, that whatever may be said of the one, would, anatomically speaking, apply to the other; the results, however, of modern investigators, by substituting for the purely graphic notion of eminences and depressions, a methodical recognition of regular folds, constant in their form and connections, have caused a corresponding revolution in our ideas of cerebral physiology, by tracing a distinct relation between the degree of development of the different groups of convolutions and their intellectual value.

Dr. Todd says that although the convolutions of opposite hemispheres in the human subject cannot be said to be absolutely unsymmetrical, yet a careful examination will show that if the same convolutions exist on each side, they are of apparently different sizes, and not closely corresponding as regards situation; on the other hand, he says, that in the imperfectly developed brains of the idiot, or young child, as well as of the inferior animals, the convolutions are quite symmetrical.*†

M. Broca, who never takes anything for granted, and

* *Cyclopedia of Anatomy and Physiology*, vol. iii., p. 369.

† Dr. Moxon considers that education is unilateral, that the brain becomes unsymmetrical in higher and more intelligent animals, and reaches its greatest want of symmetry in man, whose early life is spent in the acquirement of what he affirms to be one-sided educational developments.—*British and Foreign Medico-Chirurgical Review*, vol. xxxvii., p. 489.

whose indefatigable zeal led him to examine forty brains, came to the conclusion that the convolutions are notably more numerous in the left frontal lobe than in the right; and that the converse condition exists in the occipital lobes, where the right is richer in convolutions than the left.

In considering the question of cerebral symmetry, the inequality in the development of the corresponding regions of the skull should be taken into account. Of 287 skulls examined by Lebon, this author has observed that in 125 cases the right side was most developed, in 111 instances the left was the most prominent, and in 51 cases there was equality—symmetry in the two regions.*

Of late much has been written about cerebral anomalies, and asymmetry, and an attempt has been made not only to establish a relation between these anomalies and aberrations of intelligence, but also between them and alteration of the moral sense—"la criminalité." Amongst those who have written upon this subject are Benedikt in Germany, and Hanot and Féré in France.

It has been stated that in malefactors, there has been observed an unfolding or reduplication of the second frontal convolution, thus increasing the number of frontal convolutions from three to four, as occurs in carnivorous animals. Benedikt observed this arrangement in a large number of brains of murderers, and Professor Bouchard, of Bordeaux, informed the Anthropological Society of

* Dr. Meynert has made a number of careful craniological studies on the skulls of 128 lunatics who had died at the general hospital at Vienna; and he found that the capacity both of the male and female skull in lunatics is greater than that of the normal skull, but that this superior cranial capacity is not accompanied by any greater brain weight.—*Jahrbuch für Psychiatrie*, Heft 2, 1879.

Paris, that he had verified the existence of this supernumerary convolution in the brain of a young man who had recently been guillotined.

Benedikt asserts that if the brains of murderers do not present real anomalies, they at least exhibit more frequently than others, abnormal or rather unusual communications between the convolutions. M. Féré, in writing upon this subject, observes that if the majority of malefactors present only insignificant anomalies, there exist, on the other hand, subjects that cannot be ranged in the criminal category, that offer most important malformations; and he illustrates these remarks by the history of a female not belonging to the criminal class, where the asymmetrical anomalies were most striking. He adds that it must be borne in mind that there are scarcely two brains that resemble each other exactly, and furthermore, that no brain is exactly symmetrical at any period of its development, and it would seem that this asymmetry is not special to man, but is found in the monkey.* M. Féré asserts that this unfolding of the convolution does not constitute an anomaly, but merely an anatomical variety which is observed in a large number of persons not belonging to the criminal class; also that since Benedikt first called attention to this subject, he has examined hundreds of brains, and has acquired the conviction that the reduplication is a very common anatomical arrangement.

It will be seen, therefore, that there is a great divergence of opinion as to the existence of this fourth frontal convolution, and I recommend the subject to

* Ch. Féré Contributions à l'étude de la topographie cranio-cérébrale chez quelques singes.—Journal de l'anatomie et de la physiologie, 1882, p. 556.

the consideration of the new sect of Criminal Anthropologists, that has lately sprung up, by whom it will doubtless be deemed important from a medico-legal point of view.

The science of Criminal Anthropology has attracted so much notice on the continent, that a journal has recently been established—"Les Archives de l'Anthropologie Criminelle," having for its object the dissemination of scientific information bearing upon the genesis of crime; the criminal being studied as a distinct type of humanity, presenting physical, as well as mental characteristics, which separate him from ordinary men. One contributor to this periodical, Enrico Ferri, a member of the Italian parliament, asserts that all crime depends upon three kinds of factors—anthropological, physical, or social. The social factor (want, &c.) predominates in simple theft, and the anthropological factor in murder! The same writer discusses the relation between crime and thermometric variations. Another writer, also an Italian, Professor Lombroso, seems to have established a new class of the genus homo, under the title of "*Uomo delinquente*."*

* Professor Lombroso regards the criminal as a reversion to the savage type, and he gives a detailed description of the physical characters of the habitual homicide with "the cold, glassy, immobile look; the eyes somewhat bloodshot; the nose often aquiline or hooked; strong jaws, long ears, large cheek-bones, hair crisp, abundant, and dark; the canine teeth prominent, thin lips, open nervous contractions of one side of the face, so as to give a grimacing or threatening look." The above is the description of a monster whom the French criminal anthropologists would characterise as being afflicted with "*l'hystérie du sang*."

Amongst the various scientific congresses lately held in Paris, during the period of the International Exhibition, was one on Criminal Anthropology, when M. Manouvrier read a paper in which he stated that the characteristics enumerated by Lombroso, have in many instances been observed in men of

The criminal anthropologists seem to have invented a phraseology peculiar to themselves; persons who commit heinous crimes in cold blood are said to be affected with "psychical anæsthesia," a modification of which is spoken of as "psychical dysæsthesia!" In psychical dysæsthesia, the feelings are perverted, impressions vitiated, and there exists a true "psychical neuralgia" which by degrees culminates into complete "psychical anæsthesia." I ought to add that this language is used more particularly in reference to criminal lunatics, and in considering the medico-legal signification of "psychical anæsthesia," we are cautioned against concluding that all villains who murder their victims are irresponsible agents.

I do not propose to enter upon the wide, delicate, and much disputed question of the relation said to exist between mental disturbance and criminality, nor am I disposed to discuss the question as to whether there be any necessary connection between moral and intellectual sense and the gross morphology of the brain; but I cordially re-echo the sentiments of Professor Osler that 'one thing is certain, that as society is at present constituted, it cannot afford to have a class of *criminal automata*, and

spotless character; therefore, they cannot be accepted as undeniable indications of criminal propensities. The presence of the metopic suture having been cited as an indication of criminality, M. Manouvrier examined in the Paris catacombs 28 crania, and in five this suture existed; he considers, therefore, that the presence of this suture is not an anomaly, but only a peculiarity.

A further contribution has been made to criminal pathology by Dr. Gradenigo, of Turin, who asserts that criminals show a marked preponderance over other persons in respect of deafness; he tested the hearing of 82 healthy male criminals, and he found more or less marked deficiency of hearing in 55 of that number (67.3 per cent.)

to have every rascal pleading guilty grey matter in extenuation of some crime.’*

The comparative weight of the two hemispheres is an interesting point to note. The researches of M. Broca, made at Bicêtre and at La Salpêtrière, have shown that although the difference of weight between the right and left hemispheres is scarcely appreciable,† yet the left frontal lobe is perceptibly heavier than the right; there would seem, therefore, to be a sort of compensation between the weights of the two frontal and the two occipital lobes, as we have already seen that the right occipital lobe is richer in convolutions, and therefore presumably heavier than the left.

In a treatise on the brain of man considered from an

* On the Brains of Criminals, by W. Osler, M.D.—Canada Med. and Surg. Journal, Feb., 1882.

† According to Dr. Boyd’s statistics, which are based on nearly 800 cases observed at the Marylebone Infirmary, the weight of the left hemisphere almost invariably exceeded that of the right by at least the eighth of an ounce. Philosophical Transactions, 1861, vol. 151, p. 241.

M. Luys examined the brains of 32 adult females from 18 to 90 years of age, and his statistics are all the more valuable because the selection was purposely made from subjects entirely free from any cerebral complication during life. Upon these statistics, M. Luys based the following conclusions. 1° In the normal condition, asymmetry of the two lobes is the rule in the human species; in the 32 brains examined, he found inequality of the central lobes 27 times. 2° The predominance of the left lobe is the rule; the left lobe was the largest in more than three-fourths of the 27 cases where inequality was observed, the exact proportion being as 78 to 22. *L’Encéphale*, No. 4, 1881, p. 644.

A more recent observer, Dr. Ireland, in his communication to the Psychological Section of the British Medical Association at Leeds, on the Double Brain and the Discordant Action of the Hemispheres, said that the two hemispheres were unequal in weight, the right being the heavier—contrary to what might be expected, for the left had the most work to do.

anthropological point of view, Professor Nicolucci observes that large brains whilst they remain healthy, are generally the seat of high intellect; but this rule is not absolute, for brains of ordinary size may be endowed with superior faculties, provided they are well formed, thus proving that the structure and organisation of the brain is more important than its volume and weight.*

Statistics exist of the weight of the brains of twenty-three eminent men, and the discrepancy observable seems to bear out Nicolucci's views; for the list is headed by Cuvier the naturalist, whose brain weighed $64\frac{1}{2}$ ounces, whilst that of the orator Gambetta weighed only 39 ounces, being 10 ounces below the average weight of the adult male.† Furthermore, the examination of Mr. Grote's head, which was made by Professor Marshall, reveals the fact that the brain of the deceased historian was remarkably small; it is said, however, to have been rich in convolutions.

The question of the identity of minute structure in the different cerebral convolutions must now engage our attention. M. Baillarger distinguishes six different layers of nervous substance in the convolutions, and Dr. Lockhart Clarke says that in most of them at least seven distinct and concentric layers may be distinguished.

* *La Psichiatria*, Napoli, 1883, Fasc. 3.

† I shall have more to say about the brain of the great French orator further on; the report in reference to its weight has led to the publication of an immense number of brain weights. The brains of Abercromby the physician, and of Schiller the Poet, weighed 63 ounces; Sir James Simpson's weighed 54, Broca's 50, and that of Chalmers 53; the brains of Napoleon and Daniel Webster 57 ounces. The heaviest brain on record, which weighed 67 ounces, was that of a bricklayer, who could neither read nor write.

Dr. Clarke says that the other convolutions differ from those at the extremities of the posterior lobes, not only by the comparative faintness of their several layers, but also by the appearance of some of their cells; he also adds that at the extremity of these posterior lobes the cells of all the layers are small, but on proceeding forward from this point, the convolutions are found to contain a number of cells of a much larger kind; again, in the insula which overlies the extra-ventricular portion of the corpus striatum, he finds a great number of the cells are somewhat larger, and the general aspect of the tissue is rather different. M. Broca has also studied the minute structure of the cerebral convolutions, and has ascertained that the relative thickness and general disposition of the six layers recognised by M. Baillarger differ notably in the divers regions; and although his researches are not definitely terminated, he ventures to assert that the structure of the convolutions of the insula differs from that of the frontal convolutions and of the hippocampus major.

Vulpian, in his chapter on the anatomical elements of the brain, states that no difference in structure has been discovered in the various regions of the cerebral cortex.*

Professor Grasset, in the chapter of his classical work on "Diseases of the Nervous System," in which he treats of the structure of the convolutions, says that the distribution of the different elements is not the same in all parts of the brain, and that the 'giant cells' seem to belong only to the motor zone, and that they are met with especially in the ascending frontal and ascending

* *Leçons sur la Physiologie générale et comparée du Système Nerveux*, p. 649.

parietal convolutions, and in the paracentral lobule. The same writer in his treatise, entitled "*Des Localisations dans les Maladies Cérébrales*," gives a general summary of our present knowledge of the histology of the cerebral cortex; and in comparing the different regions, he says that the surface of the hemisphere, from a histological point of view, may be divided into two fundamental regions, limited by the furrow of Rolando.*

Bevan Lewis, whose recent researches are so well known, maintains that there is not only great diversity of structure throughout the various convolutions of one hemisphere, but between the same convolutions in the two hemispheres; and in writing to me upon this subject, he says that connective over-growth is in his experience more frequent on the left side than on the right; and that it is a most usual thing to meet with sclerotic states of the left cortex in which the right wholly escapes; moreover, it is his daily experience to note the great differences in structure due to morbid change between the same convolutions on the two sides;

* At the international congress of psychologists held in Paris in 1878, at which I was present, Mierzejewski laid before the meeting the result of his elaborate experiments on the brains of idiots, and the Russian professor's conclusions strongly militated against the notions commonly entertained as to the relative value of grey and white matter in the development of mental force. As the manifestation of the intellectual powers is supposed to be in some way connected with the development of the grey matter of the cerebral convolutions, one would expect to find in idiots a deficiency of this element of brain tissue. Dr. Mierzejewski, who illustrated his communication by casts of the brains of idiots, showed that this is by no means the case, and he mentioned an instance of an idiot in whose brain the surface of grey matter was enormous. So it would seem that there is no fixed relation between the amount of grey matter of the brain and intellectual power, for richness of grey substance and abundance of nerve cells may be accompanied by idiocy.

and certainly the third frontal gyrus is no exception to this rule.

Dr. Broadbent has kindly favoured me with a private communication in reference to his researches as to the course of the fibres of the brain, so far as his observations bear upon our subject. Dr. Broadbent's dissections show that the structure of the third frontal convolution is peculiar, inasmuch as it receives fibres from a greater variety of sources than any other convolution; and he adds that although this anatomical fact does not throw any particular light on the function of the third frontal convolution, it seems to indicate that it is an important part of the hemisphere. In comparing the two sides of the brain, Dr. Broadbent has usually found the third frontal convolution larger on the left side than on the right; and in the brain of a deaf and dumb woman, he noted that this gyrus was small on both sides, and especially on the left.

Rudinger has published an essay in which he describes and delineates a series of brains of barristers who were celebrated for their oratorical powers. In all, the third frontal convolution presented a much greater development than is observed in other classes.*

Professor Mathias Duval, the Director of the Laboratory of Anthropology at Paris, has published a detailed description of the external configuration of the brain of Gambetta, which, M. Duval says, 'thanks to the intervention of enlightened friends was preserved and studied in the anthropological laboratory.' M. Duval draws especial attention to the fact that the cortical structure of the third left frontal convolution was greatly in excess of that of the opposite side, and in commenting

* Anatomie des Sprachcentrums, 1882.

upon this fact he says, 'quelle personnalité a jamais représenté à un plus haut degré l'orateur improvisateur, le moteur verbal?' As Gambetta was gifted with great oratorical powers, the increased growth of cortical tissue in the neighbourhood of the third left frontal convolution has been cited as confirmatory of Broca's theory of the localisation of speech.*

PHYSIOLOGY. In consequence of the delicate instruments of precision now available, the physiology of nerve-tissue furnishes a fertile field of investigation; still, notwithstanding the great progress which has been made in this direction of late years, our knowledge of the functions of the cerebral cortex is far from complete. What does physiology say to Dax's theory, which has in its favour the undoubted frequency of aphasia with right hemiplegia, as compared with loss of speech as an accompaniment of sinistral paralysis? This may possibly be explained by the anatomical difference between the origin of the right and left carotids, making the supply of blood to the left side of the brain more direct than that to the opposite hemisphere; and by increasing its functional activity, thus rendering the left hemisphere

† L'aphasie depuis Broca, par Mathias Duval, Paris, 1888. This treatise is illustrated by engravings of the right and left hemispheres of the great French orator's brain, and its author suggests that each scientist should leave testamentary direction that his brain should be utilised for scientific purposes after his death. This idea which, M. Duval says, was first promulgated by Bertillon, has rapidly spread in Paris, where a society was formed in 1880, under the title of "La Société mutuelle d'autopsie," having for its object the utilisation of the brains of its members after their death. This scientific body has received government recognition, and its rules have been approved by a decree of the Prefect of Police of the city of Paris.

more adapted for the exercise of speech. Emboli, which are so frequent a cause of disturbance of speech, are also much oftener carried into the left common carotid than into the right, from the fact that the former arises from the arch in a line almost exactly coinciding with the course of the blood current, and an embolus would naturally enter this vessel instead of the innominate.

It would be interesting to know what effect would be produced upon speech by cutting off the direct supply of blood from the left hemisphere.

On looking over the published cases of ligature of the common carotid artery, I find that one of the earliest instances is one where the left common carotid was tied in 1815, by Mr. Dalrymple, the well known Surgeon to the Norfolk and Norwich Hospital, for aneurism by anastomosis of the left orbit. In this case speech seems not to have been affected, for it is stated that 'a few minutes after the patient was placed in bed, she declared that her head no longer felt like her old head, as the noise by which she had been so long tormented had now ceased.'*

Dr. Wm. Ogle quotes a case where the left common carotid artery was tied by Mr. Lee; the patient died in two days, and in the interval between the operation and his death he was speechless.†

In the *Medico-Chirurgical Transactions* for 1859 and 1865, are recorded four cases in which the left common carotid was tied by Mr. Nunneley of Leeds; speech was unaffected in three instances, but in the fourth, great difficulty in speaking was noticed on the sixth day. Since the publication of these cases, Mr. Nunneley has

* *Medico-Chirurgical Transactions*, 1815, v. 6.

† *St. George's Hospital Reports*, 1867, p. 111.

tied the common carotid in two other instances, and he writes to say 'in neither of these was there any difficulty in speech, either as regards the idea or the power of utterance.'

The connection between sinistral cerebral lesions and asemic troubles in the right hand is generally, although not invariably, observed; and an important question for inquiry is, the frequency of the coincidence of left hemiplegia with aphasia in left-handed people. Instances of this combination have been recorded by several observers. Dr. Wadham has published the case of a young man of eighteen, who belonged to a left-handed family, as four of his brothers, as well as himself, were left-handed; a fatal termination having resulted, there was found to be an almost entire absence of the island of Reil on the right side, its place being occupied by a large cavity containing a little fluid and a small amount of broken-down brain-matter; the left hemisphere was perfectly healthy. In nearly a hundred cases of paralysis with impairment of speech observed by Dr. Wm. Ogle, the palsy, except in three instances, was on the right side; in the three exceptions where the palsy was on the left, all the three persons were left-handed.

M. Féré, at the Société de Biologie, at Paris, reported a case of left hemiplegia with aphasia, describing it as simple logoplegia without agraphia, for the patient wrote with the right hand what he was unable to express by articulate language. This case, which at first sight seemed to contradict modern ideas of localisation, in reality confirmed them; for on inquiry, it was found that the patient was left-handed.*

* L'Encéphale, 1885, No. 4, p. 481.

As a cognate question, I would ask, why are we right-handed? Is the human race right-handed by mere accident? Although there are a few left-handed people in the world, the immense majority of persons use the right hand for every mechanical act; and man has from time immemorial been considered as a right-handed animal. Is this a question of education or of mere imitation? If we concede this, we must admit that our ancestors in remote ages must have been influenced by some cause connected with the organisation itself; if it were a mere chance that had determined the choice of the right hand, we should find some left-handed races in certain parts of the world, which, I believe I am right in stating, is not the case. Besides, this question may be set at rest, says M. Broca, by the consideration 'that notwithstanding all their efforts to counteract it, there are left-handed people, who remain left-handed; and one must, in their case, admit the existence of an inverse organic predisposition, against which imitation, and even education, cannot prevail.'

Bichat attributes the predominant use of the right hand to our social habits;* he says that the wants of society render it necessary that a certain number of

* Ferrier says that why dextral pre eminence should occur in the first instance is not quite satisfactorily made out, but his remarks upon this subject would seem to imply that he shares the views of Bichat, for he says that a person who has lost the use of his right hand, may by education and practice, acquire with his left all the cunning of his right. In such a case, the manual motor centres of the right hemisphere become the centres of motor acquisitions, similar to those of the left. In the same chapter, in speaking of the left articulatory centre as the one commonly and specially educated for speech, he says that there is no reason, beyond education and heredity, why this should necessarily be so.—*Functions of the Brain*, 2nd edition, p. 451.

general movements should be executed in the same direction, in order to be generally understood, and by common consent this direction is from left to right. The letters which are employed in writing are thus directed, and this circumstance compels the use of the right hand, which is better adapted for this manner of writing than the left would be.* Dr. Wm. Ogle, in commenting upon the above explanation, says that Bichat seems to have forgotten, that eastern nations—the Jews, for instance—in writing, move the hand from right to left, and yet are as much right-handed as ourselves.

Dr. Erlenmeyer, in an essay on the Physiology and Pathology of Writing, states his belief founded upon a passage in the “Talmud,” that the ancient Hebrews wrote with the left hand; and that our use of the right hand is owing to our being taught to write with it, and that the greater use of the right arm determines the predominance of the left side of the brain. The old Hebrews, he says, because they were left-handed, had a better developed and better nourished right brain. Dr. Erlenmeyer also quotes the case of a man, who, from an attack of apoplexy, had hemiplegia of the right side with aphasia; he could not write with the right hand, and when he was induced to try to do it with the left hand, he wrote very skilfully his name from right to left in mirror-writing, that is writing like the impression on blotting paper, which can be best read by looking at it in a mirror.†

* *Recherches physiologiques sur la Vie et la Mort.*, p. 25, Paris, 1805.

† *Centralblatt für Nervenheilkunde*, 1880. Dr. Ireland, in commenting upon the reference to the mode of writing of the Hebrews, says that Erlenmeyer is clearly not aware that left-handedness is mentioned as a peculiarity in the Book of Judges, chap. iii. 15 and 16.

The whole question of dextral pre-eminence is treated in a masterly manner by Dr. Wm. Ogle, who finds the explanation of this phenomenon in the greater weight of the left hemisphere, and in its structural peculiarity of being more highly developed. He gives some very curious statistics about the prevalence of right-handedness; of 2,000 consecutive hospital patients, no less than 85 were left-handed ($4\frac{1}{2}$ per cent). If, says he, the education hypothesis were correct, one would expect to find that these 85 left-handed persons were the children of left-handed parents, who had trained their offspring in their own peculiarity. This, however, was not the case, as of the whole 85 persons, only 12 had a left-handed parent. He further adds that man is not the only right-handed animal, and that observations made by him on monkeys have convinced him that they, like men, are, as a general rule, right-handed; of 23 monkeys that he examined at the Zoological Gardens, 20 were right-handed. It will hardly be said that a monkey is disciplined by its parents to use one hand in preference to the other; and the only conclusion one can draw is that the similar dextral pre-eminence of man and monkey depends on some common fact in their anatomical structure. For these and other reasons, Dr. Ogle concludes that the generally held opinion which attributes dextral pre-eminence to educational influence is erroneous; and that right-handedness, though to a certain extent it may be strengthened or modified by education, has some other basis in our bodily confirmation.*

It would be interesting to ascertain whether any similar difference between the two sides exists with other

* Medico-Chirurgical Transactions, vol. liv., 1871.

members of the animal kingdom. Aristotle, in alluding to the preferential use of the right hand by the human race, asserted that the right side had a preferential motor function in nearly all the animal creation, and he particularly described the crab as having the right claw distinctly larger and stronger than the left—*μείζων γὰρ καὶ ἰσχυρότερα ἡ δεξιὰ*.

At the discussion on aphasia which took place at the meeting of the British Association at Norwich in 1868, Professor Broca alluded to the circumstance that all birds perched on the right leg: Dr. Crisp, on the other hand, said that this peculiarity was confined to Grallæ, and he believed it was a question of equilibrium, and that the bird was compelled to take this position from the greater weight of the liver! Dr. Ogle, who has made repeated observations in birds of various kinds, says that parrots are the only birds in which he has been able to detect with certainty any pre-eminence in one side above the other; of 86 parrots that he tested, 63 invariably perched on the right leg.

The study of Embryology may assist us here. An eminent foreign physiologist, Gratiolet, says that in the development of the brain, the frontal convolutions of the left hemisphere are in advance of those of the right; and that the left are already properly figured, whilst the right are not yet even visible. Thus, according to Gratiolet, the left hemisphere, which holds in its dependence the movements of the right limbs, is more precocious in its development than the opposite hemisphere; and thus the young child uses by preference the limbs of which the innervation is the most complete, or in other words he becomes right-handed. From the cause which thus makes us use the left hemisphere for

mechanical acts, may arise the circumstance of our using it in preference for speech, and we thus become left-brained—*gauchers du cerveau*—to use M. Broca's expression. But is this theory of the early development of the left frontal convolutions true? Gratiolet says it is; Carl Vogt, an equal authority, denies it. This is an extremely interesting and important question, about which very few are in a position to give a valid opinion, and I regret I can quote no British authority in reference to it.

COMPARATIVE ANATOMY.—Does the study of Comparative Anatomy throw any light upon our subject? Here we must inquire whether language be the exclusive prerogative of man? Some would answer this question in the negative, and M. Lemoine, in the work to which I have already alluded, devotes a chapter to *Le Langage des Bêtes*.

Le Conte, in his "History of China," says of an ape which he saw in the streets of Molucca, that its actions so strongly resembled those of man, and its passions were so lively and significant, that a dumb person could scarcely make himself better understood, or more plainly express his ideas and desires. Mr. Waterhouse described the gibbon's voice as much more powerful than that of any singer ever heard, and the remarkable faculty of imitation and of gesticulations possessed by the ape tribe, together with their power of giving expression to a variety of emotions would seem to imply the possession of a faculty to which one might properly give the name of language; it is not, however, articulate speech, but merely a form of the general faculty of language of which I have spoken in a preceding chapter.

There is a language springing from the emotions which animals possess in a high degree; by the vocal sounds of a dog or of a cat, and by the postures and movements that accompany them, we know perfectly well whether the animal is pleased or angry, frightened or feeling at ease. Darwin tells us that apes utter in anger sounds much resembling interjections, and he mentions the case of a young female ourang made jealous by the attention of a keeper to another ape, and who showed her teeth slightly, and uttered a sulky noise like "tisch-schist," turning her back on him at the same time. This emotional language, man, of course, possesses in common with animals, though, perhaps, not to the same extent as they.

The parrot has been cited as an instance of the possession of rudimentary speech, but this bird only mimics the human voice, because he is endowed with the faculty of imitation to a high degree; the talk of the parrot is merely an "acoustic reflex." Animals, doubtless, possess the power of expressing their emotions and desires, and of rendering themselves intelligible in their own sphere, but they are destitute of the *λογος*—the power of uttering a word, which, originating in thought, includes both reason and speech, and which is the peculiar and exclusive prerogative of Man.

In my treatise on "Darwinism tested by Language," I have entered at great length into the question of the language of animals, and I have endeavoured to show that Articulate Speech is a distinctive attribute of man; that the ape and lower animals do not possess a trace of it, and that it furnishes the difference of *kind* between man and animals which Mr. Darwin asserted did not exist.

Max Müller, speaking of this subject, says, 'Speech is a specific faculty of man. It distinguishes him from all other creatures; and if we wish to acquire more definite ideas as to the real nature of human speech, all we can do is to compare man with those animals that seem to come nearest to him, and thus try to discover what he shares in common with these animals, and what is peculiar to him, and to him alone.' Further on he says, 'Language is something more palpable than a fold of the brain or an angle of the skull; it is the one great barrier between the brute and man; it admits of no cavilling, and no process of natural selection will ever distil significant words out of the notes of birds or the cries of beasts. Language is our Rubicon, and no brute will dare to pass it.'

One of the differences between man and the more intelligent animals is in the degree of development of the cerebral convolutions, which, moreover, exist only in the class Mammalia; and according to Flourens, the Rodentia, the least intelligent of the Mammalia, have no convolutions; the Ruminantia, more intelligent than the Rodentia, have convolutions; the Pachydermata, who are still more intelligent than the Ruminantia, possess still more convolutions; and so on the number continues to increase as we ascend to the Carnivora, then to the Apes, the Orangs, and lastly to Man, who is the richest of all animals in cerebral convolutions.

A more recent naturalist, Professor Huxley, says that in the lower and smaller forms of placental Mammals, the surface of the cerebral hemispheres is either smooth or evenly rounded, or exhibits a very few grooves, which are technically termed sulci; and the smaller species of all orders tends to a similar smoothness of brain. In the

higher orders, the grooves become extremely numerous, and the intermediate convolutions proportionately more complicated in their meanderings, until, in the Elephant, the Porpoise, the higher Apes, and Man, the cerebral surface appears a perfect labyrinth of tortuous foldings.

If this gradation in the number of the convolutions has a relation to the intelligence of the animals, it would seem to give an *a priori* reason for concluding that the highest product of intelligence—speech—may well have some connection with the development of the convolutional grey matter.

As the researches of naturalists all tend to establish a physiological homology of the brain of man with that of the ape—for both are constructed on the same type, and contain essentially the same primary fissures and convolutions—let us consider for one moment the comparison which Carl Vogt makes between our quadrumanous cousins and ourselves. According to this distinguished naturalist, the Apes have an extremely imperfect development of the third frontal convolution, and the same condition exists in the Microcephali; therefore, he says, as neither Apes nor Microcephali can speak, Comparative Anatomy gives a subsidiary support to the theory which places speech in this convolution. Professor Vogt's views seem to me of such great importance, and so extremely pertinent to our subject, that I shall give them in his own words.

The brain of Man and that of Apes, especially of the anthropoid apes (Orang, Chimpanzee, Gorilla), are constructed absolutely upon the same type—a type by itself—and which is characterised, amongst other things, by the fissure of Sylvius and by the manner in which the island of Reil is formed and covered,* but there are

* The island of Reil, so often injured in affections of speech, is an im-

secondary differences in the arrangement of the folds, and in the comparative development of the lobes and of the convolutions.

One of the principal characters is, that in the brain of all the human races, without exception, the frontal lobe, by its posterior and inferior part (that is in Broca's region) touches the temporo-sphenoidal lobe, so as to give to the fissure of Sylvius with its two branches, the appearance of a double-pronged fork; whilst in the Ape, Broca's convolution is separated from the temporo-sphenoidal lobe by the lower end of the transverse frontal and transverse parietal convolutions; in other words, in Man, the third frontal convolution is extraordinarily developed and covers partly the insula, whilst the transverse central convolutions are of much less importance; in the Ape, on the other hand, the third frontal convolution is but slightly developed, whilst the central transverse convolutions are very large, descending quite to the edge of the hemisphere, and giving to the fissure of Sylvius the form of a V. The cause of this difference dates from the period of embryonic development:—the brain of the foetus of any of the Mammalia at a certain age (two months in Man), has the form of a bean with a large infero-lateral sinus corresponding to the insula and the surrounding parts. From the third to the fifth month, this large space becomes covered in Man by the *very rapid* growth of the third frontal convolution, and by the *slow* growth of the transverse central convolutions; whilst in the Ape, it is just the reverse, the space is filled by the *rapid* growth of the transverse central convolutions, and by the *slow* growth of the third frontal convolution.*

portant characteristic of the human brain. It may be said really to exist in no other mammifer; it is true the monkey has one, but it is quite smooth, scarcely offering a trace of a fold in the higher apes, such as the orang and the troglodytes. Gratiolet—*Anatomie Comparée du Système Nerveux*, tom. ii, p. III.

* Professor Hartmann, of Berlin, does not agree with the above statement as to the imperfect development of the third frontal convolution in the Ape, for he says, 'Far from being feebly developed in the Chimpanzee, the Orang, and the Gibbon, or even entirely absent in most of the other apes, as asserted by Bischoff, the third frontal convolution is well developed in the apes. The most striking feature in the structure of these animals is the shortness of the corpus callosum.'—*Les Singes anthropoïdes et leur organisation comparée à celle de l'homme*, 1886.

To show the bearing all this has upon the seat of speech, I would refer to the Microcephali who do not speak—they learn to repeat certain words like parrots, but they have no articulate language. Now, the Microcephali have the same conformation of the third frontal convolution and of the central folds as Apes—they are Apes as far as the anterior portion of their brain is concerned, and especially as far as regards the environs of the fissure of Sylvius. Thus, Man speaks; Apes and Microcephali do not speak; certain observations have been recorded which seem to place language in the part which is developed in Man and contracted in the Microcephali and the Ape; comparative anatomy, therefore, comes in aid of M. Broca's doctrine.*

I have reason to believe that these views of Professor Vogt are not very generally known in this country, and I need hardly allude to the extremely important bearing they have upon the question at issue. With the view of obtaining some confirmation of the statement of the arrest of development in the third frontal convolution of the microcephali, I have consulted Mr. Marshall's extremely interesting paper in the *Philosophical Transactions* for the year 1864, in which he gives a detailed description of the frontal convolutions of a microcephalic woman and boy, neither of whom possessed the power of articulation. In both these brains, the frontal convolutions are described as being singularly short and defective, as compared with their wonderfully tortuous and complex character in the perfect brain; in fact, Mr. Marshall adds that they were far more simple than in the orang's or the chimpanzee's brain. In only one

* The above is an extract from an autograph letter with which Professor Vogt has favoured me. In this communication, he expresses a doubt whether we shall ever be able satisfactorily to assign "the divers functions" which compose language, to special parts of the brain, until we have a physiological analysis of articulate language, similar to that which Helmholtz has given of sight and hearing.

of these microcephalic brains, however, was the want of development most apparent in the third frontal convolution. Further investigations would, therefore, seem necessary before admitting with Carl Vogt that the conformation of the microcephalic brain gives a direct support to the localisation of speech in the third left frontal convolution.

Experimental pathology, of course, cannot supplant clinical observation, but it may lead us to clearer scientific notions of the nature of disease. M. Bouillaud, so well known for his elaborate researches by means of experiments on animals, obtained certain results, which, although not proof against criticism, or directly useful in the treatment of disease, yet as the outcome of methodical scientific inquiry, must be considered as valuable contributions to the physiology of the nervous system.

As far back as 1827, M. Bouillaud instituted a series of experiments upon animals, with the view of determining the functions of the brain, and on several occasions he removed different portions of the cerebral lobes, without impairing sight or hearing ; he also removed the entire hemispheres from a chicken, in which the power of expressing pain by its peculiar cry was retained.* On one occasion he pierced with a gimlet the anterior part of the brain of a dog, from side to side, at a spot corresponding to the union of the anterior with the middle lobes—that is in the immediate neighbourhood of Broca's region. The dog survived the mutilation, but was much less intelligent than before the operation,

* *Recherches expérimentales sur les fonctions du cerveau.* Journal de Physiologie, tom. x., p. 49.

and although he could utter cries of pain, he had entirely lost the power of barking.*

The recent researches of Hitzig and Ferrier indicate the region of the third frontal convolution and the insula as the motor centre for the tongue and lips. Duret has twice extirpated this region in dogs, in order to see if phenomena would arise analogous to those observed in man after lesion of the third frontal convolution; in both instances the dogs seemed to have lost the power of barking. Goltz, of Strassburg, on the other hand, maintains that dogs, whose pretended barking centres are destroyed, can still bark, howl, and growl; in fact, can give phonetic expressions of their feelings in many different ways.

As far as the present inquiry is concerned, I am aware that but little importance can be attached to these experiments, for there is little or no analogy between the cry of a chicken or the bark of a dog, and the articulate speech of man; animals that express their feelings by screaming, crowing, croaking, &c., are still able to utter these sounds after their brain, up to and including the corpora quadrigemina, has been removed. Furthermore, the celebrated "croaking experiment" of Goltz shows that a frog, as long as it possesses a brain, does not as a rule croak when the back is stroked; as soon, however, as the cerebrum is cut away above the corpora quadrigemina, every soft stroking of the back evokes a croak.

Although the results of different experimentalists upon the brain of animals have been various and contradictory, still, experiments of this kind may have an indirect bearing upon our subject, and it would be extremely

* Op. cit, p. 85.

interesting to know what would be the effect of traumatic injury to certain regions of the anterior lobes upon the quasi-articulatory powers of the parrot.

I think that much valuable information in reference to the seat of speech may be elicited from a more careful study of the affinities and differences between the brain of man and that of animals; but this study, surely, should not be confined to the convex surface, or even to the anterior half of the hemisphere. Professor Rolleston, in a most interesting paper, has called attention to other points of difference between the brain of man and that of apes, and he attaches a great physiological value to the presence or absence of the "*bridging convolutions*," which more or less fill up the space known as the external perpendicular fissure, which separates the occipital from the parietal lobe.*

Professor Owen mentions the superior development of the hippocampus minor, as a point of distinction between man and the lower animals. According to him, in the inferior mammalia the posterior cornu of the lateral ventricle is capacious and simple; whereas in the chimpanzee and gorilla, the growing walls begin to be reduced by the encroachment of a protuberance, which in the archencephala is developed into the hippocampus minor.† It will be remembered that it was in this lesser hippocampus that Dr. Barlow formerly located the faculty of speech.

* *Medical Times*, Feb. 22nd and March 15th, 1862. There are many other points in Dr. Rolleston's paper, which, although having no direct bearing upon speech, afford a collateral aid to that subject, and it is impossible to overrate the value of the talented Oxford Professor's researches in this direction.

† *Comparative Anatomy and Physiology of the Vertebrates*, vol. iii., p. 138.

ANTHROPOLOGY. The comparative facility of speech in different races of mankind is an interesting point to notice, and it is much to be regretted that we possess so little authentic information upon this subject. Let us consider what variations are observed in the morphological characters of the brain in different branches of the human family.

Gratiolet has established three principal divisions of our species under the names of Frontal or Caucasian, Parietal or Mongolian, and Occipital or Ethiopic. He has shown that in the Caucasian, the anterior fontanelle is the last to ossify, in order to permit of the greatest possible development to the frontal lobes ; and that in the Ethiopic race the converse condition exists, the posterior fontanelle being the last to ossify. According to this arrangement, in the superior races, the frontal lobes of the hemispheres continue to develop themselves for a long time after the occlusion of the posterior sutures has put an end to the growth of the rest of the brain ; in the inferior races, on the contrary, the ossification of the sutures proceeds from before backwards, and thus the anterior parts of the brain are first arrested in their growth.

Barnard Davis, whose craniological researches have rendered such immense service to anthropological science, says that the cranium is subject to variations of size and of form, almost endless in the different races of man ; and that these diversities are coincident with and allied to disparities of powers, capacities, and character, which may be considered to a certain extent commensurate with the differences of conformation themselves. In treating of the synostosis of the cranial bones, he adds that the premature obliteration of the sutures is of the

utmost importance in craniology; its tendency being to change the natural shape of the calvarium, and thus prevent the further development of the brain. He places the skull of the Australian in a category which is characterised by under-sized and ill-developed brains, narrow and low anterior lobes, manifested in crania of small capacity, of little elevation, contracted and recedent in the frontal region, with generally a large amount of osseous matter in their composition.*

M. Broca, the founder of the Paris Anthropological Society, whose ethnological researches are so well known, directed his attention principally to that branch of anthropology which treats of the physical characters of the different human races; and from his craniometrical observations, aided by the various instruments that he invented, comparative craniology has acquired an exactitude and precision equal to any other branch of comparative anatomy.

In a progressive civilisation, such as prevails throughout the greater part of Europe and America, there is reason to suppose that the cranial capacity of the population is, upon the whole, increasing. Owing to the want of early observation, it is difficult to institute comparisons between the past and present; an opportunity, however, occurred in Paris a few years ago, which was taken advantage of by M. Broca, who has given the result of his examination of 384 skulls exposed in excavations made in Paris; they were divided into three series, one corresponding to a period antecedent to the 12th century, a second to the 16th, and a third to the 19th century. A comparative study of these skulls showed that the average

* *Crania Britannica*, vol. i., pp. 231, 233, 235.

cranial capacity had increased during seven or eight centuries by more than 35 centimètres, the increase being almost exclusively in the frontal regions. Of the 125 skulls of the 19th century series, by noting the place of burial and other circumstances, a distinction could be made between the rich and the poor, disclosing an average difference of 80 cubic centimètres in favour of the former—*la classe aisée*.*

That the increase in cranial capacity has gone on slowly but surely, as man has progressed from barbarism to civilisation, may be inferred from a study of the cranial capacities of the various human races; thus, while the brain capacity of the European amounts to 94 cubic inches, it is stated to be only 91 in the Esquimaux, 85 in the negro, 82 in the Australian,† and 77 in the Bushman. Thus, civilisation, by giving increased exercise to the brain, has, there is good reason to believe, gradually produced that increase of brain capacity which now distinguishes the civilised from the savage races of mankind.‡

* Broca—*Sur la capacité des crânes Parisiens des diverses époques*. *Bulletins de la Société d'Anthropologie*, 1862.

† According to Professor Flower, metopism or permanent opening of the frontal suture is rare in Australians; in 100 Australian skulls examined, it was not open in one instance. Dr. Flower adds that the Australian resembles the anthropoid apes, amongst which metopism is rare.

‡ A few years ago a controversy was carried on, in which Professor Flower, Dr. Kesteven, Mr. Hyde Clarke, and others took part, in reference to the size of heads, and it was asserted that a sensible diminution had taken place of late years in the size of the heads of the male population of these islands; the data upon which this startling statement was founded, were supplied by the most persistent, if not the most scientific, class of head measurers—the hatters. Numerous letters upon this subject appeared in “Nature,” and one manufacturer of hats wrote to say that heads generally

I am aware that there is another side to this question, for there exists a widely spread opinion that modern civilisation and social pressure, arising mainly from the extraordinary scientific discoveries of the closing decades of the nineteenth century, are actually causing degeneration of brain power, as shown by the fact that insanity and neuroses are on the increase; this, although a matter of vital importance, is a question of cerebral hygiene, to which I can only make an incidental allusion. This idea, however, is not new, for the ancients, instead of

are two sizes less than they were thirty or forty years ago, and that a head of more than 24 inches in circumference is now quite a rarity, whilst thousands of hats are made for heads with a circumference of about 21 inches. Professor Struthers, of Aberdeen, who has kindly favoured me with information upon this interesting point, very justly remarks that 'the hat is not an infallible test, as it does not mark the height of the head.'

If, however, as seems probable, hats, on the whole, are smaller than they were a generation ago, I cannot think it justifies the inference that the cranial capacity has diminished; but the fact is rather to be explained by a change of fashion, and the mode of wearing both hat and hair. Thirty years ago, it was customary to wear the hat well drawn down over the head, covering the occiput and ears, and the hair was worn long and thick. I think these two causes will more adequately explain the decrease in the size of hats, rather than the supposition that the heads of the male population have sensibly diminished—a theory quite at variance with the notions of recent anthropological science, which tells us that with a progressive civilisation, such as prevails through the greater part of Europe and America, there is reason to believe that the cranial capacity of the population is, on the whole, increasing rather than diminishing.

A theory as old as Herodotus assumes that the thickness of the skull depends upon the use or otherwise of head coverings. In his description of the battle of Pelusium, Herodotus says:—The bones of the slain lie scattered upon the field in two lots, those of the Persians in one place by themselves, those of the Egyptians in another place. If you strike the Persian skulls, even with a pebble, they are so weak, that you break a hole in them; but the Egyptian skulls are so strong, that you may smite them with a stone and you will scarcely break them in. The natives assigned as

believing in perpetual progress, maintained that humanity was always deteriorating, and, strange to say, in proportion to the progress of civilisation! This notion seems to have pervaded the minds of legislative reformers, historians, and poets; and Horace made himself the echo of the common opinion when he said:—

“*Damnosa quid non imminuit dies?
Ætas parentum pejor avis tulit
Nos nequiores, mox daturos
Progeniem vitiosiore.*”

Livy, Tacitus, and other writers, up to the fall of the Roman empire, seem to have confirmed the general opinion of the progressive deterioration of the human family.

The important researches made in reference to ancient skulls by the Abbé Frère, whose rich collection is in the anthropological museum at Paris, led him to the conclusion that the skulls of Europeans have increased in size since historic times; and that the progress of civilisation seems to have resulted in raising the anterior, and flattening the occipital part of the skull. I recommend the data of the Abbé Frère to the especial consideration

a reason for this difference, that the Egyptians from early childhood have the head shaved, and so by the action of the sun, the skull becomes thick and hard. The same cause prevents baldness in Egypt, where you see fewer bald men than in any other land. Such then is the reason why the skulls of the Egyptians are so strong. The Persians, on the other hand, have feeble skulls, because they keep themselves shaded from the first, wearing turbans upon their heads.

Sir G. Wilkinson, in commenting upon the above passage, says that the thickness of the Egyptian skulls is observable in the mummies; and that those of the modern Egyptians fortunately possess the same property of hardness, to judge from the blows they bear from the Turks, and in their combats among themselves.

of Professor Max Müller and others who are engaged in the great controversy of the evolution of language.

The tardy occlusion of the anterior sutures, as stated by Gratiolet, tends to prove that the development of the higher faculties of the intellect is in relation with the development of the anterior region of the skull; and that the frontal lobes form the substrata of those psychical processes which lie at the foundation of the higher intellectual operations. With the view of verifying the accuracy of this theory, M. Broca examined the heads of thirty-two house-surgeons who had successively resided at Bicêtre during the years 1861—1862, and compared their dimensions with those of the heads of twenty-four porters attached to the various wards of the same hospital. This comparison resulted in the confirmation of the generally received opinion, that the anterior lobes are the seat of the highest order of intellectual faculties; and M. Broca considered that he had demonstrated that the cultivation of the mind and intellectual work augment the size of the brain, and that this increase chiefly affects the anterior lobes.

This predominance of the anterior lobes over the rest of the brain, has, of course, an indirect connection with the disputed question of the localisation of the faculty of articulate language.

Anthropology is calculated to render great service to the student of the science of language, for the study of this branch of knowledge is not limited to anthropometrical observations, compiling statistics, or collecting skulls, but anthropological research embraces all facts bearing upon the evolution of the human species; and if it be true that simplicity in the arrangement of the convolutions of the brain is a mark of structural inferiority,

that a want of symmetry between the convolutions of the two hemispheres is one of the signs of intellectual superiority, that premature obliteration of the sutures is common in the inferior races, it would be extremely interesting to notice the relation between these characters and the degree of facility of speech in the different races of mankind.

Having now considered the subject of speech, its loss, and its localisation, in all its various phases and aspects, I would observe that I am aware that my remarks may be said to be of an iconoclastic character. I may be told that I have set up the authors of the four popular theories for the mere pleasure of knocking them down again, without substituting any theory of my own in their place.

In reference to these doctrines, the truth and value of which I have called in question, it is no fault of mine if the pedestals upon which they stand are rotten; and that certain stubborn facts stand in the way of their unreserved acceptance. In lieu of offering any hypothesis myself as to where the cerebral centre for speech may be, I would ask, Is it certain that there is a cerebral centre for speech at all? When we talk of the "*faculty of speech*," have we any very clear and definite notions as to what we mean? * May not speech be one of those

* Dr. Maudsley denies the existence of a speech faculty, and says, 'There is no more a special faculty of speech in the mind than there is a special faculty of dancing, or of writing, or of gesticulating. All the voluntary movements of the body may be called the outward expressions of ideas. The movements of the tongue have not a special kind of connection with the mental processes, although the connection is an intimate one. If a person be dumb, he must use the muscles of some other part of the body to express his ideas.'

attributes, the comprehension of which is beyond the limits of our finite minds; and may it not be dependent upon a *nescio quid* which the knife of the anatomist cannot reveal, and the test-tube of the chemist is unable to detect? If the outward manifestation of this innate faculty is connected with certain definite organic conditions, it is not logical to confound these conditions with the faculty itself. Does the loss of it necessarily imply organic lesion of structure? If it were so, how can we account for the instances I have quoted, in which the restoration of the power of speech was due to the effect of a severe mental shock? Intemporary aphasia, there is evidence of some fugacious affection of the cerebral substance, such as congestion, anæmia, molecular changes from psychical excitement* or from atmospheric or other influences with which we have little or no acquaintance; in fact, the literature of aphasia furnishes abundant evidence to prove that great emotional excitement, a moral shock, a rush of blood to the head, a rapidly developed ischæmia of the brain, such as is apt to occur in affections of the heart and in arterial sclerosis, are sufficient to produce disturbance of speech.

The brilliant experiments of Dr. Richardson, of freezing the cerebrum of animals, which it has been my privilege to witness, conclusively show that various cerebral functions may be temporarily but completely suspended, without leaving any trace of organic mischief. In some lower animals, such as frogs, the nervous centres can be

* A remarkable illustration of molecular change is given by Fournié, who, in speaking of the movements of matter, says that the blow of a hammer on a bar of steel gives rise to a sonorous movement and to caloric, the caloric to electricity, and the electricity to light. *Physiologie de la voix et de la parole*, Paris, 1886.

frozen for long periods, with recovery after entire unconsciousness and apparent death ; these refrigerated frogs do not respire during insensibility, and whilst in that state can be placed without harm in gases which, under ordinary circumstances, would not support life. Dr. Richardson has thus placed animals in hydrogen, nitrogen, and carbonic acid. In one experiment, when the animal was frozen, it was immersed in ether, the temperature of which was not sufficient to thaw the animal ; after the complete abolition of all the functions and the cessation of respiration, if the thawing process was conducted with precautions, the animals revived completely. I confidently predict that the question of the localisation of our different faculties is destined to receive considerable elucidation from Dr. Richardson's valuable researches.

The late Dr. J. T. Dickson has recorded an experiment on a pigeon, whose brain was frozen while the bird was in the act of eating oats. The impression of feeding was evidently frozen on the brain cells, for the moment the brain was thawed, the bird again began to peck as though feeding, although the floor was bare. Dr. Dickson cited the above experiment as illustrative of his views of the "Potentiality of Vitality." It is very evident that there could have been no structural change in the nerve elements of the animals submitted to these experiments, and whose functions were temporarily suspended ; and it is equally clear there could be no organic change in the brain of many of the patients mentioned in the previous pages, and who were the subjects of transitory aphasia.*

* General cerebral pathology may receive considerable aid from the study of insanity, which in many cases cannot be traced to any visible and palpable lesion of the brain, and is then essentially a psychological phe-

It has occurred to me to inquire whether during the anæsthesia produced by the inhalation of chloroform, there is any altered structural state of the cerebral tissue, which would be patent to our senses, supposing we were in a condition to make the necessary examination. From experiments lately made in Paris by Dr. Ferraud, it would seem that the action of chloroform on the cerebral nerve tissue is direct by means of the olfactory nerves, and that the production of the anæsthetic condition does not necessitate the passage of the drug into the arterial system by means of the pulmonary mucous membrane.*

nomenon. Esquirol, one of the greatest authorities, goes so far as to say 1° that organic lesions of the brain and of its membranes are in general only observed in complicated cases; 2° that all the lesions observed in lunatics are often found in those who have not lost their reason; 3° that in a large number of cases, the brain of lunatics presents no appreciable alteration whatever, although the mental derangement may have lasted for many years; in support of his views, this writer asks how sudden cures of insanity can be explained, on the hypothesis of an organic lesion. Doubtless it may be said that Esquirol lived at a time when only the gross morphology of the brain was studied; but with all the facilities for investigation now available, alienists of the present day are obliged to admit that in many, if not in most cases, the cause of mental derangement does not reveal itself in any structural alteration of the brain.

* I am aware that the above conclusions have been disputed by other physiologists (Dieulafoy and Krishaber). M. Ferraud's experiments, however, seem to me to be conclusive; having opened the trachea in rabbits, he introduced a tube, and then divided the trachea above; a small cupping glass, containing a sponge imbibed with chloroform, was then placed over the nose of the rabbit; in three minutes the anæsthetic condition was produced, and maintained as long as the olfactory apparatus was submitted to the action of chloroform. When the same animal was chloroformed by means of the tracheal tube and the respiratory apparatus, anæsthesia was produced a little sooner (*i.e.*, by 15 seconds) than when the anæsthetic was administered by the olfactory apparatus. *Gazette des Hôpitaux*, May 29 1869.

May not loss or lesion of speech depend on some altered state of the cerebral tissue not appreciable to the sense of vision—to the eye—for microscopic examination is only the aided eye? Without doubt, there may be changes going on in nerve tissue which escape our means of investigation, and I am supported in this view by one of the greatest continental histologists, who, in conversing with me about softening of the brain, said that he believed there were changes of structure not revealed by the microscope, but which were patent to the sense of touch. I find that Dr. Sankey is of the same opinion, for he thinks the altered specific gravity of the brain in old people indicates that the nerve tissue has undergone some change of structure which the microscope has not yet made palpable to our vision.* The nutrition of the organ in such cases is doubtless in some way disturbed, but the alteration is too fine for detection by the aid of our present means of investigation.

The fact of the occasional benefit obtained from the use of electricity in impaired speech, as observed by Dr. Marcet and others, would lead to the inference that the defect may depend in some instances upon an altered electrical condition—upon some dynamic change and altered polar arrangement of the ganglionic cells. ‘It may be,’ says Dr. Beale, ‘that each little brain cell with its connected fibres, in some way resembles a minute voltaic battery with its wires; the matter of which the cell is composed undergoing chemical change, in the course of which slight electrical currents are developed; these being transmitted by the fibres ramifying to

* On the state of the Small Arteries and Capillaries in Mental Disease. Journ. Ment. Science, Jan., 1869.

different parts, exert an influence upon tissues and organs amongst which they ramify.*

Some physiologists consider epilepsy to be the result of a sudden, temporary, and excessive discharge from some highly sensitive region of the cerebral cortex—the discharging lesion being a group of cells whose instability is raised above normal.

May not some thermal change, the result of chemical action, interfere with the exercise of speech? In the section on diagnosis, I have already alluded to cerebral thermometry; it is extremely probable that some thermal change in the brain may account for disturbance of speech, quite irrespective of any structural alteration, for the part which temperature plays in the circle of morbid action has not been fully recognised. Much, however, has been done in this direction of late years, although doubt has been expressed as to whether the temperature of the scalp affords any correct indication of the cerebral temperature, notwithstanding the elaborate instruments that have recently been invented.

In the *Centralblatt der med Wissenschaft*, No. 27, was an account of experiments made by Dr. Maragliani of Genoa on the dead body, in order to ascertain whether the temperature within the cranium is correctly indicated through the thermometer laid upon the scalp. Having placed his instruments on different parts of the shaved head, he then introduced another within the skull, the cavity of which was filled with hot water. He then found on comparing the temperature of the outer and inner thermometers, that within half an hour the difference was about two degrees. He also observed

* Lectures on the Germinal or Living Matter of Living Beings. *Medical Times*, July 10, 1869.

that in many cases the temperature of the head was found to be higher than that of the axilla, showing that the brain has a heat independent of the general temperature. Mental activity, age, and sex, he added, have a marked influence upon the temperature of the brain. He also found that to obtain correct results, it was often necessary to prolong the observation for an hour.

Certain chemical changes may take place in the brain substance which imply a departure from healthy physiological action, and, in consequence of these changes, there is a more or less prolonged retention in the blood of some product which ought to be eliminated.

I am glad to find that the study of the chemical composition of the blood, as a factor in nervous diseases, has not escaped the attention of Dr. Bevan Lewis, who, in his recently published work, says that 'a diminution in hæmoglobin is clearly indicated in all cases of general paralysis examined. The corpuscular richness varied considerably—in fact, from 75 to 126 per *hæmic unit*, the higher register pertaining to cases where maniacal excitement prevailed. No connection is established, however, between mania and such corpuscular richness, since a diminution in the number of red corpuscles is quite as often, and, in our experience, more frequently, met with in maniacal conditions. What is of more importance to note is the diminished colorometric power of the corpuscle, the proportion of hæmoglobin varying from 52 to 75 per cent. Taking into consideration the corpuscular richness, we find that the absolute deficiency of hæmoglobin gives a corpuscular value varying from 56 to 89 per cent.'

* A Text-book of Mental Diseases, by W. Bevan Lewis. Page 287, 1889. C 2

Dr. Bristowe's researches on Pernicious Anæmia show how, without any organic lesion that has hitherto been discovered sufficient to account for it, without any recognised malarious or similar influence, without any apparent climatic or dietetic default, the blood undergoes progressive deterioration, especially as regards the number and quality of its corpuscles; the red corpuscles may be diminished by thirty or forty per cent. of their proper number,* and they are also mostly smaller, paler, and less consistent than usual, and tend to alter in shape, and especially to become elongated and to break down; and they do not usually run into rouleaux.†

* Whilst this chapter is passing through the press, my attention has been called to a case of Pernicious Anæmia under the care of Dr. Lockie of Carlisle, in which the red corpuscles, which had been reduced to 2,010,000 per cubic millimètre, under appropriate treatment, including transfusion, were in a few weeks more than doubled in number, having increased to 4,790,000 per cubic millimètre.—British Medical Journal, January 18th, 1890.

† Dr. Leven has made a series of observations at the Rothschild hospital, demonstrating the influence of the nerve centres in increasing and diminishing the number of blood corpuscles. Irritation of the nerve centres will frequently produce aglobulia, reducing the corpuscles by several millions, and it is only when this irritation is removed that their normal number is restored. Dr. Leven mentions several cases illustrative of the pathogenetic influence of the chemical composition of the blood, in special reference to the number of the corpuscles.

Seppilli says that in the early stages of insanity, there is frequently noticed a scarcity of the red blood globules as well as of hæmoglobin; also that the degree of hypoglobulia and scarcity of hæmoglobin vary between very wide limits. The same observer gives the result of his examination of the blood of 200 inmates of the asylum at Imola. The points investigated were the proportion of red corpuscles (by Hayem's method), and the amount of hæmoglobin, as estimated by Bizzozero's chromocytometer. The result showed that the red discs are less in number, and the hæmoglobin diminished in amount in a large number of cases of insanity in their early stages—more frequently and more markedly in women than in men. This,

Here I would observe, that although we are living in an age when organic chemistry is vastly increasing our knowledge of the essential nature of disease, writers on disorders of the nervous system have paid but little attention to the chemical pathology of the brain; the gross morphology as well as the minute structure of that organ have been studied with the greatest care, and the vascular arrangements by which it is supplied with blood, as also the lymphatic channels by which its waste products are eliminated, are thoroughly understood, but the problems involved in cerebral metamorphosis have received relatively but little attention, although there are good grounds for believing that changes of all kinds in the nerve-centres are accompanied by certain chemical phenomena. Dr. Adam Addison has paved the way for more extensive researches on this subject by his extremely interesting and highly original paper in the *Journal of Mental Science* for July, 1866, in which he very justly says he is treading on a field which is a *terra incognita* of unknown extent. The result of Dr. Addison's observations—which are all the more valuable because they are controlled by comparison with those of Bibra, L'Héritier, Schlossberger and others—are as follows :—

1° That the different anatomical parts of one and the same brain present great differences in their quantities of water and fat.

2° That the grey substance is far poorer in fat than the white.

3° That the quantity of matters soluble in ether, stands in an inverse relation to the quantity of water.

4° That the quantities of phosphorus do not have a parallel connection with the degree of intelligence.

he says, confirms the conclusions at which Dr. Rutherford Macphail arrived in his prize essay—*Rivista Sperimentale*.—*Italian Retrospect, Journal of Mental Science*, April, 1888.

5° That in three cases of hemiplegia the average quantity of fat in the corpus striatum, optic thalamus, and grey substance of the hemisphere opposite the paralysis, was less than the average quantity in the same parts of the other side.

It is to be regretted that Dr. Addison did not supplement his most useful essay by a special chemical analysis of those particular portions of the brain in which the seat of speech has been severally placed by the various authors who have written upon the subject.

At present we are only on the very outskirts of this inquiry, but before we can understand the pathological chemistry of the brain, it is evident we must possess accurate knowledge of the normal chemical condition of that organ, a subject which has lately received considerable elucidation from the elaborate researches of Dr. Thudicum, who considers the brain as the most marvellous chemical laboratory of the animal economy; and in the chemical combinations of which the phosphorised and nitrogenised principles of the cerebral tissue are susceptible, he finds the key of many of the diseases of the nervous system. Chronic alcoholic intoxication he considers to be a combination of alcohol with the phosphorised principles and the cerebromides, such a condition being curable by dissociation, or washing of the alcohol out of the brain and nerves by great volumes of watery blood free from alcohol, as introduced by the digestive organs.

During the last few years, a fresh impetus has been given to the study of the Chemistry of the Brain, and it is a curious subject for inquiry how far the variation in the capacity for conversational activity, depends upon the chemical composition of the brain; for there cannot be a doubt that certain nations and certain individuals,

apparently endowed with the same intellectual power, and possessing the same educational advantages, differ widely in their power of expression, and in the facility and brilliancy of their discourse; and it has been customary to contrast, in this respect, the stolid Dutchman with the lively vivacious Frenchman.

The most extravagant notions were at one time prevalent as to the rôle played by phosphorus in the animal economy; the Dutch naturalist, Moleschott, maintaining that "without phosphorus there was no thought!" For him, phosphorus was the great agent of thought and intelligence, the universal stimulant—in fact, the soul itself!*

A celebrated chemist, Couerbe, also considered phosphorus to be the exciting principle of the brain, and according to him, the brain of ordinary men contained $2\frac{1}{2}$ per cent. of phosphorus, that of the idiot $1\frac{1}{2}$, and that of the madman 4 to $4\frac{1}{2}$; and he stated that an average proportion of phosphorus produced the admirable harmony observed in the mental capacity of mankind.† If it were true that a great excess of phosphorus gave rise to maniacal volubility, it might be said that a moderate excess of this element might explain the reason why two persons with similar social and educational advantages should differ so widely in their power

* A Russian observer, Dr. Laleski, as the result of some experiments to determine whether purpura was associated with any increase of iron in the body, states that more iron appeared to exist in the grey than in the white substance of the brain.

† A German. Feuerbach, adopted so firmly this phosphorus theory, that he did not hesitate to attribute the cause of intellectual decay in Europe to the exaggerated use of the potato, which contains very little phosphorus, and he proposed to replace this vegetable by pea soup, a very phosphorised aliment.

of conveying their ideas to the external world. Couerbe, moreover, asserted that the brain of animals did not contain phosphorus, but subsequent researches have not confirmed this opinion; and it has been proved that the brain of fishes, which do not pass for great thinkers, contains a great amount of phosphorus; in fact, the views of Couerbe on the chemistry of the brain have been entirely refuted by other observers, one of whom, M. Lassaigne, who analysed the brains of insane persons, found that they did not contain more phosphorus than the brains of healthy persons in general.

The question of the connection between the amount of phosphorus in the brain and intellectual vigour has attracted the attention of later observers. In 1879, M. Jolly communicated to the Academy of Sciences, of Paris, the result of his researches on the different modes of combination of phosphoric acid in the nervous substances. According to this observer, the brain of the calf is very rich in phosphorised elements; in the grown ox, it is the spinal cord that contains most of them; and after alkaline phosphates, the phosphates of iron are most abundant. More recently still, in 1884, M. Mairet made this question the subject of a communication to the same Academy, under the title of "The influence of intellectual activity upon the elimination of phosphoric acid in the urine." In this paper he formulated the following conclusions. 1° That phosphoric acid is intimately connected with the nutrition and proper working of the brain; that the brain when active absorbs phosphoric acid in combination with alkalis, and gives out phosphoric acid in combination with alkaline earths. 2° That intellectual work retards general nutrition; modifies the elimination of phosphoric acid by the

urine; diminishes the quantity of phosphoric acid combined with alkalis, whilst it increases the amount of the same acid in combination with alkaline earths.

To enter at large into such a comprehensive subject as the Chemistry of the Brain would far exceed the limits of this treatise; it is, however, to be hoped that this important subject, hitherto so much neglected, will receive more attention than has hitherto been accorded to it. Further researches in this direction would prove extremely valuable, for the process of nutrition in different tissues of the body must vary with their chemical composition, and the result may be a defective functional activity which is quite compatible with an absence of any apparent histological change; and there cannot be a doubt that many obscure diseases of the brain will be shown to be connected with special chemical changes in neoplasin, and an accurate knowledge of the chemical composition of this tissue and of its constituents, must materially aid us in arriving at a more correct diagnosis in various forms of obscure cerebral disease.

Practitioners of the healing art are no longer divided, as in the good old days of yore, into solidists and humoralists, but without identifying myself with the doctrine of the humoral pathologists which attributed all diseases to changes in the blood, lymph, or bile, still I am inclined to think that in our over anxiety to connect every disorder, in some way or other, with structural lesion, we are apt to overlook the condition of the fluids of the body; and in corroboration of this view, I would refer to the recorded cases of loss of speech from the effect of certain drugs such as Stramonium, Belladonna, also from the introduction into the lymphatic system of a poison from the bite of a snake. Possibly

the discovery of the perivascular canals of His, and of the existence of miliary aneurisms in the minute arteries of the brain, may serve as an element for a better understanding of certain functional disturbances of that organ, and it is not improbable that much that is now obscure in cerebral pathology may depend upon some abnormal vaso-motor disturbance influencing certain parts of the brain.*

In bringing this long dissertation to a close, I wish to add that I am painfully sensible of the great disproportion which exists between the demands of this important subject, and the capacity of the person who has undertaken to deal with it; and my own sense of inadequacy is enhanced by the consideration, that although one of the most learned scientific bodies in the world devoted the long period of two months to its elucidation, the discussion in the Academy of Medicine of Paris terminated without a solution of the difficulties which its members had attempted to grapple with.

I have heard it said in reference to this inquiry, *cui bono?* What good purpose is served by the numerous and extensive researches which have been, and are still being made, to decide whether we have, or have not, a portion of our cerebral substance, to which belongs the exclusive prerogative of presiding over articulate language? Now to this objection I would apply the trite

* In the elaborate paper by Dr. Sankey, to which I have already referred, is the following passage corroborative of these views:—‘Each act of cerebation (which results from an action of the blood and the cerebral tissue) requires that the blood be unimpaired in quality, and of a just quantity; blood impaired as to quality produces imperfect cerebation, as proved by the injection of poisons into the blood, and by the action of certain drugs which are known to enter the circulation.’

remark that all knowledge is power ; besides, surely no subject is more worthy of the careful investigation of all labourers in the field of science than the Origin of Speech ; it is one of the questions in which the physiologist and the student of language meet, and now that the sluice-gates of public opinion are opened upon it, error will be swept away, and a fresh impulse be given to the study of the mind ; and the practical discoveries and brilliant achievements of recent workers in this branch of science, constitute the grandest triumphs that adorn the history of modern medicine. Moreover, the scientific result of the recent researches about the seat of speech, need not necessarily be limited to the acquisition of a better knowledge of the conditions under which that faculty is developed or lost ; for since the attention of the profession has been directed to the investigation of the causes which interfere with the exercise of speech, a new flood of light has been thrown upon the minute anatomy and physiology of the nervous centres, which may eventually lead to the localisation of our other faculties, and it is not too much to say that through the study of the phenomena of speech, we may hope to get a clue to the solution of many other problems connected with the nervous system which are now shrouded in obscurity.

The definite solution of the question I have been discussing has been retarded by the fact that authors, in many instances, have written with pre-conceived notions, which really are only sketches on the canvas of their fancy ; upon the ground-work of problematic conceptions, and arbitrary assumptions, they attempt to rear a premature generalisation of crude hypotheses ; and their works bear the impress of a desire to prove one theory as against another, rather than to place on record facts

which may, as it were, speak for themselves. Some not wishing to leave the scientific rut in which they have so long moved, content themselves with boldly asserting that this or that theory cannot be—that it is contrary to common sense, and is the annihilation of all traditional scientific data. Others decline to discuss the unilateral theory, on the ground that it is impossible that a perfectly symmetrical organ like the brain should possess a property in one hemisphere not appertaining to the other. Now the question is not so much how it is, but if it is; we must take facts as they are, and not try to make them fit in with our pre-conceived notions; and if rigorous pathological observations confirmed by necroscopic verification, should happen to furnish a number of facts sufficiently significant to establish an evident relation between certain functional alterations of speech, and the lesion of certain definite parts of the encephalon; in that case, all conjectural propositions, all crude assertions, and all metaphysical speculations, must vanish before the light of scientific truth.

It is in the spirit of the above remarks that I have endeavoured to approach this inquiry, and if in my attempt to unravel the difficulties with which this subject is surrounded, I have only succeeded in making “confusion worse confounded,” I would say with Heberden—*“Fateor equidem ea esse rudia, inchoata, et manca; cujus rei culpa, ut maximam partem in me recidat, partim tamen in ipsius artis conditionem erit rejicienda.”*

INDEX.

- Abercrombie, 70, 119, 272
 Academy of Medicine of Paris,
 discussions at, 26
 Addison, on the Chemistry of the
 Brain, 400
 Adriani, on auscultation of the
 cranium, 285
 Ælian, on gesture language, 173
 Aglobulia, influence of the nerve
 centres in, 399
 Agraphia, not a material but a
 psychical inability, 203
 — the morbid lesion in, 205
 — caused by disturbance in the
 cheiro-kinæsthetic centre, 210
 Allbutt Clifford, 281
 Allen J., 294
 Amimia, G. Ballet on, 212
 Anæmia Perniciosa, on, 399
 Anæsthesia psychical, on, 365
 Anatomy Comparative, its bearing
 upon the speech question, 378
 Andral, 18
 Anstie, on the sphygmograph, 283
 Anthropology, its use to the student
 of the science of language, 392
 Ape, on the gesture language of
 the, 378
 — Darwin on the emotional lan-
 guage of the, 379
 Ape, the imperfect development of
 the third frontal convolution in
 the, 381
 Aphasics, the testamentary capacity
 of, 301
 — not absolved from civil and
 criminal responsibility, 312
 — on left-handed, 373
 Aphonia not to be confounded with
 aphasia, 278
 Aphthongia, 145
 Aristotle, on the sensorium com-
 mune, 316
 — on the preferential use of the
 right hand, 377
 Asemia, 153
 Asymbolia, Finkelnburg on, 151
 Atmospheric changes, their effect
 on speech, 271
 Aubertin, 329
 Auditory centre, on the, 40, 229
 Auditory verbal memory, 180
 Augier, 277
 Aulus Gellius, 294
 Automatic writing, Myers on, 153
 — utterances, 240
 Autopsy mutual, the society for,
 371
 Bacon, 167

- Baillarger, 223, 367
 Baillie, 54
 Bain, on the cerebral elements, 318
 Baker Sir S., on the universality of speech, 160
 Ball Professor, on spasmodic ischæmia, 146, 239
 — on traumatic aphasia, 261
 — his comparison of the brain to a violin, 357
 Ballet, 130, 218, 226, 336
 Banks, 80, 272, 297
 Barlow, on the location of speech in the hippocampus minor, 386
 Bastian, on auditory, visual, and kinæsthetic memory, 180
 — on sensory aphasia, 216
 — on the tardy development of speech, 251
 Beale, on the electrical action of the brain cells, 397
 Béclard, 333
 Béhier, 30
 Bell J., on traumatic aphasia, 262
 Belladonna, its effect on speech, 273
 Benedikt, on cerebral asymmetry 362
 — on the tardy development of speech, 288
 Bennett A. Hughes, on sensory aphasia, 217
 Bérard, 32
 Bergmann, 46, 244
 Bernard Claude, 265
 — on mirror-writing, 210
 Bernhardt, on word-deafness, 222
 Bernheim, on hypnotism, 336
 Bichat, on dextral pre-eminence, 374
 Bigelow, 90
 Billod, 302
 Bishop, 161
 Blanchet, on deaf-mutism, 24
 Bonnet, 317
 Bouchard, 362
 Boudet, 243
 Bouillaud, his theory of localisation, 18, 325
 — his challenge, 27
 — his experiments on the brain of animals, 384
 Boyd, his statistics on the weight of the brain, 366
 Bradley, 848
 Brain, Macewen on the surgery of the, 253
 — from an anthropological point of view, 367
 — not the sole organ of the mind, 325
 — compared to a violin, 357
 — minute anatomy of, 360
 — weight of its hemispheres, 366
 — of animals, Dr. Richardson's experiments on, 394
 — cells, each a minute voltaic battery, 297
 — chemistry of the, 400
 — tumours of, their effect on speech, 36, 253, 326
 — weight of, in eminent men, 367
 — of Gambetta, description of, 370
 Brierre de Boismont, on the speechlessness of the insane, 281
 Bristowe, on the re-education of the nervous centres, 298
 — on pernicious anæmia, 399
 Broadbent, on the structure of the third frontal convolution, 370
 Broca, his description of the cerebral convolutions, 16
 — his typical cases, 20

- Broca, his theory of localisation, 19, 343
 — on the general faculty of language, 164
 — his mode of taking the temperature of the cranium, 283
 — on cerebral symmetry, 362
 — on comparative craniology, 388
 — his comparison of the heads of house-surgeons and those of ward-attendants, 392
 Browne Sir Crichton, 127, 147
 — W. A., 201
 Brown-Séguard, 176, 270, 357
 Buchwald, on mirror-writing, 210
- Cabanis, on the minute anatomy of the brain, 360
 Cadge W., 62, 327
 Cannabis Indica, its effects on speech, 274
 Cartaz, on hypnotic suggestion, 338
 Castagnon, 29
 Catacombs of Paris, Manouvrier's researches in the, 365
 Catsaras, 127
 Centre, auditory, 40, 229
 — visual, 40, 231
 — nerve, re-education of the, 297
 Cerebral asymmetry, on, 362, 366
 Cerise, 158
 Charcot, his diagram of articulate and written language, 39
 — on the passive and active phases of language, 180
 — on hemianopsia and word-blindness, 236
 — on hysterical mutism, 242
 — his experiments on hypnotism at La Salpêtrière, 334
- Charpentier, on the effect of electricity on aphasia, 288
 Chauffard, 235
 Cheiro-Kinæsthetic centre, on the, 181, 210
 Chemistry of the brain, on the, 400
 Chloroform, its action on the brain tissue, 396
 Churchill, 133
 Cistercian monks, their gesture-language, 170
 Clarke Sir Andrew, 282
 Clarke Lockhart, on the olivary bodies, 324
 — on the minute structure of the convolutions, 368
 Coleridge, 189
 Common Carotid, ligature of, and its effect on speech, 372
 Comparative Anatomy, 378
 Congenital aphasia, on, 246
 Congress at Washington, discussion at, 353
 — of psychology at Paris, 369
 Convolutions, cerebral, description and arrangement of, 16
 — — minute structure of, 367
 — — comparative development of in animals, 380
 Convolution, second frontal, its reputed reduplication in murderers, 362
 Convolution, third frontal, its peculiar structure, 370
 — — — its comparative development in man and the ape, 382
 — — — the result of its extirpation in dogs, 385
 — — — its congenital absence, 348
 — — — its atrophy in a deaf-mute, 370

- Convolution, third frontal, its greater development in orators, 370
 — — — — its great size in the brain of Gambetta, 371
 Copeman, 60
 Copland, 55, 286
 Corneille, on the language of physiognomy, 168
 Corpus Callosum, in the ape, 382
 Cortex cerebri, on the histology of the, 369
 Couerbe, on the phosphorus theory, 403
 Cranial capacity, Broca on, 388
 — — — — researches of Barnard Davis on, 387
 — — — — statistics of the Abbé Frère on, 391
 — — — — is it increasing with the progress of civilization, 390
 — — — — in lunatics, 362
 Cranium, auscultation of the, 285
 — — temperature of inside of, compared with that of the scalp, 398
 — — — — regional of, 284
 Crichton, 52, 190, 292
 Criminal anthropology, 364
 Crosse T. W., case of traumatic aphasia, 262
 Cruveilhier, 45, 323, 328

 Dalrymple W., his case of ligature of the left common carotid, 372
 Dante, on natural language, 314
 Darwin, on the emotional language of apes, 379
 Datura stramonium, its effect on speech, 273
 Davis Barnard, his craniological researches, 387
 Dax, 19, 330

 Deaf-mutism, more common in Jews, 246
 — — Blanchet on, 248
 — — not a bar to testamentary capacity, 303
 — — should not be confounded with idiocy, 249
 — — congress on, at Rochester, U.S., 314
 Debove, 241
 Delasiauve, 122, 269
 Descartes, 316
 Dextral pre-eminence, on, 374
 Diagnosis, 279
 Dickson J. T., his experiments on the frozen brain of a pigeon, 395
 Discussion on aphasia, at the Academy of Medicine of Paris, 26, 158, 333
 — — — — at Dublin, 81
 — — — — at Norwich, 179, 377
 — — — — at Washington, 353
 Duncan Matthews, 277
 Duncan and Millard, on the aphasia of the idiot, 249
 Dunn, 64, 267, 294
 Duret, on the third frontal convolution in dogs, 385
 Duval A., on aphasia without paralysis, 196
 — — Mathias, on the brain of Gambetta, 370

 Echo sign, 213
 Egyptian mummies, the thickness of their skulls, 391
 Electrical action of the brain cells, 397
 Electricity, the effects of, in defects of speech, 113, 136, 288, 292

- Embryology—Gratiolet, Broca, and Vogt, on, 377
- Emotional aphasia, 203, 266
- Epileptic logoneurosis, 136
- Erlenmeyer, on the left-handedness of the Hebrews, 375
- on agraphia, 205
- Esquirol, on the aphasia of idiocy, 249
- on lesions observed in lunatics, 395
- Etiology of aphasia, 245
- Eulenberg, 147
- Falret J., 301
- Farrar, on sound, the vehicle of thought, 161
- on gesture language, 312
- Féré, on cerebral asymmetry, 363
- Fernet, 31
- Ferrand, his experiments on the action of chloroform on brain tissue, 396
- Ferri, on criminal anthropology, 364
- Ferrier, on the visual centre, 231
- on dextral pre-eminence, 374
- on the function of the third frontal convolution, 385
- Feuerbach, on the phosphorus theory, 403
- Finkelnburg, on symbolic defects, 151
- Flaubert, 35
- Flint Austin, 91
- Flourens, on the cerebral convolutions of the mammalia, 380
- Flower, on metopism, 389
- Font-Réaulx, 247, 196
- Foster M., 341
- Foulis, 14
- Fournié, on the movements of matter, 394
- Fox Long, 347
- Fraser, 74
- Frère Abbé, on the gradual increase of cranial capacity, 391
- Frere Sir Bartle, on the universality of speech, 160
- Frogs, the refrigerated brains of, 394
- Froude, 320
- Gairdner, 73, 203, 240, 251
- Galactorrhœa in aphasia, on, 136
- Gall, his system of phrenology, 317
- Gallard, 301
- Gambetta, description of his brain, 370
- Gesture-language, Vossius on, 170
- Tyler on, 170
- Kleinpaul on, 171
- Greek and Roman writers on, 172
- used in making a will, 304
- used for the delivery of a presidential address, 314
- Ginders, on aphasia caused by the excessive use of tobacco, 274
- Giraudeau, on word-deafness, 220
- Glosso-Kinæsthetic word centre, 181
- Gogol, 9
- Goltz, on the speech centre, 357
- on the barking centre of the dog, 385
- his croaking experiment, 385
- Gowers, on aphasia as a precursor of epilepsy, 144
- on the higher visual centre, 234
- on the inhibition of the speech centre, 257
- on the fibres of the optic tract, 343
- Gradenigo, on the hearing of criminals, 365

- Grant Allen, on note-deafness, 223
 Gratiolet, on the optic tract, 342
 — on the development of the frontal convolutions, 377
 — his classification of the human races, 387
 — on the tardy occlusion of the anterior sutures, 392
 Grasset, on the triple decussation of the optic fibres, 341
 — seat of speech not a mathematical point, 351
 — on the histology of the cerebral cortex, 368
 Graves, 79, 241
 Greek Epigraphy, Roberts on, 211
 Guyot, 270
- Hamilton, on the cortical connections of the optic nerves, 342
 Hammond, 94, 143, 196, 325, 356
 Hartmann, on the third frontal convolution in the ape, 382
 Hasbach, 49
 Heads, controversy on the size of, 389
 — Broca's measurements in different classes, 392
 Hearing, loss of, in aphasia, 89
 — the psychology of, 218
 — of criminals, 365
 Hebrews, the left-handedness of the, 375
 Hemianopsia, on, 236
 Hemicrania sympathetico-tonica, 147
 Hephæstic Hemiplegia, on, 272
 Heredity in aphasia, 115
 Herodotus, on the influence of head coverings on the thickness of the skull, 390
 Heterophasia, 199
- Heubner, 183
 Hippocampus minor, its supposed connection with speech, 386
 Hippocrates, 15, 316
 Hitzig, on the function of the third frontal convolution, 385
 Hoffmann, 271, 275, 280
 Hofhäuser, 302
 Horsley, on the motor centres, 355
 Hovell de Berdt, on emotional aphasia, 268
 Huarte, on the diversity of aptitudes, 317
 Huguenin, 127, 197, 256, 356
 Hun, 84
 Hunt, 317
 Huxley, on the cerebral convolutions, 380
 Hypnotic experiments, and their bearing on the localisation of speech, 336
 Hypnotism, its two stages, 334
 — Bernheim on, 336
 — suggestion a factor in, 338
 Hysterical mutism, 241
 Hysterie du sang, 364
- Idiots, loss of speech in, 93
 — Esquirol's classification of, according to the power of speech, 249
 — Kerlin's statistics of, 249
 — on alcoholic excesses of the parents of, 250
 — Duncan and Millard, on the training and education of, 250
 — congenital absence of the two anterior lobes in, 327
 — Mierzejewski on the brain of, 369
 — amount of phosphorus in the brain of, 403

- Inhibition, aphasia from, 357
 Inhibition, speech centre, susceptible of, 257
 Insane, speechlessness of the, 281
 ——— cranial researches in the, 362
 Insanity, may be confounded with word-deafness, 223
 Interjectional expressions of aphasics, 240
 Ireland W., 295, 366, 375
 Iron, comparative amount in grey and white substance of the brain, 403
 Ischæmia of the brain, 146, 239

 Jaccoud, 29, 322
 Jackson Hughlings, 65, 197, 240
 Jackson S., 83
 Janet, 193
 Johnson S., 188
 Jolly, on the phosphorised elements in nervous substances, 404
 Jurisprudence of aphasia, on the, 300

 Kerlin, on aphasia in the idiot, 249
 Kinæsthetic verbal memory, on, 181
 Kleinpaul, on gesture-language, 171
 Kussmaul, 51, 145, 174, 204, 242, 246, 322, 358

 Labio-glosso-pharyngeal paralysis, 280
 Lacteal derangement, 131, 277
 Ladame, on aphasia in connection with tumours of the brain, 36, 253
 Ladd, on the seat of speech, 356
 Laleski, 403
 Lalopathia, 179
 Langaudin, 36
 Language, the general faculty of, 164

 Language, natural and artificial, 166
 ——— of physiognomy, 168
 ——— of gesture, 169
 ——— an acquired reflex, 175
 ——— its impressive and expressive functions, 157
 ——— Ballet, on internal, 218
 ——— of animals, 378
 ——— of the parrot, 379
 Lapeyronie, 316
 Larrey D., 186, 257
 ——— H., 258
 Lasègue, 301
 Lassaigue, 404
 Lawrence Sir W., the aphasia of, 212
 Lebon, on cerebral symmetry, 362
 Leconte, on the gesture-language of the ape, 378
 Left hemiplegia with aphasia, 49, 65, 124, 127
 Legrand du Saulle, 301
 Legrand Max, 333
 Lelut, 333
 Legroux, 349
 Lemoine, 215, 378
 Lepine, on hypnotic phenomena, 335
 Lesur, 29
 Leven, on aglobulia, 400
 Lewis Bevan, on the histology of the cerebral cortex, 369
 Lingual spasm, 128
 Lockie, on hypoglobulia, 400
 Lohmeyer, 349
 Lombard, 283
 Lombroso, description of the habitual homicide, 364
 ——— on the connection of aphasia with cardiac disease, 264
 Long F., 137
 Lordat, 109
 Louville and Debove, 241

- Lucian, on pantomimic language, 172
- Luys, on cerebral asymmetry, 366
- Lyons, 81
- Macewen, on brain surgery, 253
- Macrobius, on gesture-language, 174
- Magnan, 252, 344
- Mairet, on the influence of intellectual activity on the elimination of phosphoric acid, 404
- Malichecq, 261
- Mann, 97
- Manouvrier on criminal anthropology, 364
- Manouvriez A. on loss of speech after typhoid fever, 276
- Maragliani, on cerebral temperature, 284
- his thermometric experiments, on the dead body, 398
- Marcet, on treatment by electricity, 293, 397
- Marey, 243
- Marshall, on the frontal convolutions of the microcephali, 383
- Martin, on traumatic dysphasia, 258
- Mattei, 291
- Matter and Mind, connection between, 320
- Maty, on the connection of loss of speech with spinal disease, 59
- McKelvie, 214
- Maudsley, 312, 393
- Mayor, an aphasic, 302
- Memories, auditory, visual, and kinæsthetic, 180
- Metopic suture, on the, 365, 389
- Meynert, his craniological researches in lunatics, 362
- Microcephali, the third frontal convolution of the, 381, 383
- Mierzejewski, on the brain of the idiot, 369
- Mills C. K., on cerebral localisation, 353
- Mills R. J., case of traumatic aphasia, 262
- Mirror-writing, on, 210
- Moffatt, on the universality of speech, 160
- Moleschott, on the phosphorus theory, 403
- Monboddo, his "homo mutus," 160
- Moore W. T., on heterophasia, 202
- Moreau, on congenital absence of the third frontal convolution, 348
- Morgan, 213
- Moxon, on brain symmetry, 361
- Müller Max, on the connection between matter and mind, 155
- on the analysis of the human voice, 159
- on speech as a specific faculty of man, 380
- Munk, 232
- Murderers, the reduplication of the second frontal convolution in, 362
- Mutitas verminosa, 270
- Myers, on automatic writing, 153
- Napier L., on puerperal aphasia, 133
- Nasse, 149
- Neurokinesis, 268
- Nicolucci, on the brain from an anthropological point of view, 367
- Note-deafness, Grant Allen on, 223
- Nothnagel, 197
- Nunnely, 372
- Oedmansson, 255, 269

- Ceanothe crocata*, causing temporary loss of speech, 274
 Ogle W., 126, 178, 206, 375
 Olivary bodies, location of speech in, 42
 Optic fibres, decussation of, 339
 ——— course of, 342
 Orators, on the brains of, 370
 Osborne, 200, 228, 298
 Osler, on criminal automata, 365
 Ott, 276
 Ovid, on the language of the physiognomy, 168
 Owen, on the hippocampus minor, as a distinction between man and animals, 386
 Panthel, 267
 Pantomimic language, 172
 Paramimia, 212
 Paraphasia, 200
 Parchappe, on the physical elements of speech, 158
 Park, on the surgery of the brain, 353
 Parrot, the language of the, 379
 Pelvet, 197
 Pernicious Anæmia, on, 400
 Perroud, 212
 Peter Michel, 32, 286
 Peter the hermit, the natural language of, 166
 Pflüger, 235
 Phosphorus, its rôle in cerebral function, 403
 ——— its supposed connection with mental vigour, 404
 Physiognomy, the language of, 168, 215
 Physiology, 37
 Physiological Psychology, Ladd on, 356
 Piorry, 183, 297
 Pitres, on agraphia, 207
 Pliny, 185
 Pons Varolii, its supposed connection with speech, 325
 Popham, 82, 152, 178
 Poupon, 134
 Probate of the wills of speechless testators, 302
 Prognosis, 285
 Proust, 39, 252
 Psychical anæsthesia, on, 365
 Psychology of hearing, 218
 ——— of sight, 226
 ——— of the ancients, 315
 ——— Congress of, at Paris, 369
 Puerperal aphasia, 131, 277
 Radcliffe, 293
 Recurring utterances, 192
 Reil, island of, atrophy of in deaf-mutism, 247
 ——— ——— ——— an important characteristic of the human brain, 381
 Reflex action, loss of speech from, 270
 Renal inadequacy, 282 [270
 Richardson, his experiments on the frozen brain of animals, 394
 Richter, 241
 Right-handedness, its cause, 374
 Roberts, on Greek epigraphy, 211
 Robertson, 73
 Rolleston, on the differences between the brain of man and that of the ape, 386
 Romanes G. J., on gesture-language, 313
 ——— on the seat of speech, 353
 Roman writers, on the progressive deterioration of the human family, 291

- Romberg, 45, 287
 Ross, on the course of the optic tracts, 342
 — on the impressive and expressive mechanism of speech, 157
 Rostan, 195
 Rudinger, on the brain of orators, 370
 Ruftz, on loss of speech from the bite of a serpent, 277
 Rummo, 39
 Rush, 188
- Salpêtrière, experiments at, and their bearing on localization, 334
 Sanders, 71
 Sankey, 397, 406
 Sansom, 283
 Sauvages, 15, 270, 273
 Schäfer and Sanger Brown, on the auditory and visual centres, 230, 232
 Schroöder van der Kolk, 42, 278, 321
 Scintillant scotoma, 146
 Seat of speech, not a mathematical point, 351
 Seguin, 91
 Senses, suspension of all the, 64
 Sensory aphasia, on, 216
 Sepelli, on word-deafness, 230
 — on hypoglobulia, 400
 Servetus, 316
 Sight, the psychology of, 226
 — loss of, in aphasia, 86
 Shaw, on aphasia in the idiot, 250
 Simon Th., 61, 259
 Simpson, 67
 Sireday, 133
 Shakespeare, on the language of nature, 167
 Skae, 71
- Skulls, Persians compared with Egyptians, 390
 — ancient, Abbé Frère's collection of, at Paris, 391
 Skwortzoff, 235
 Sleep-walking and hypnotism, Tuke on, 337
 Smith Carmichael, 280, 291
 Society for mutual autopsy, the, 371
 Spectator, on heterophasia, 202
 Speech, a universal attribute of man, 160
 — the exclusive prerogative of man, 378
 — a physico-psychical act, 158
 — the somatic, and psychical elements of, 159
 — consists of a motor and a sensory function, 157
 — the emissive and executive departments of, 157
 — its mechanism compared to a telegraphic apparatus, 175
 — an acquired reflex, 174
 — its seat, not a mathematical point, 351
 — perversion of, 199
 — tardy development of, 252, 288
 — effect of mental shock on, 294
 — restoration of, by re-education of the nervous centres, 297
 — comparative facility of, in different races of mankind, 387
 Spender, 334
 Spenser Herbert, on localisation, 352
 Sphygmograph, as a means of diagnosis, 282
 Spiegel-Schrift, Buchwald on, 210
 Spitzka, on the tendon-reflex, and its relation to defects of speech, 271

- Spinal symptoms, coinciding with aphasia, 59, 116, 119, 266
- Spleen, fibrinous deposits in, 124, 126
- Starr Allen, on the function of the pons, 325
- his address at the Washington Congress, 353
- Stewart, 66, 331
- Stoker T., 297
- Stokes Sir W., 297
- Stramonium, its effects on speech, 273
- Struthers, on the hat as a test of cranial capacity, 390
- Suggestion, a factor in hypnotic results, 338
- Sumpter, 115
- Sunstroke with aphasia, 272
- Symmetry of the two hemispheres, on the, 361
- Sympathetic system, its rôle in the causation of speech disturbance, 265
- Tamburini and Marchi, on cerebral localisation, 253
- Tendon-reflex, its supposed relation to defects of speech, 271
- Tennyson, 167
- Testamentary capacity of aphasics, 301
- Thermal changes, their effects on speech, 398
- Thermometric observation in cerebral disease, 283
- experiments of Maragliani on the cadaver, 398
- Thomsen's disease, 130
- Thucydides, 185
- Thudicum, on the chemistry of the brain, 402
- Tobacco, excessive use of, its effects on speech, 274
- Todd, 56, 267, 282, 361
- Tongue, not essential to speech, 163
- Traumatic aphasia, 257
- cases of, observed by the author, 262
- Treatment, 290
- Trephining in traumatic aphasia, 260, 296
- Tricocephalus dispar, 271
- Trousseau, 26, 32, 144, 201
- Tuke and Frazer, 74
- Hack on hypnotism, 337
- Tumours of the brain, statistics of, 36
- Tylor, on gesture-language, 170
- on the will of a deaf-mute, 303
- Uræmic poisoning, on, 282
- Urine, importance of its analysis, 99
- in defects of speech, 281
- Van Swieten, on the persistence of aphasia after recovery from paralysis, 287
- Varieties of aphasia, 182
- Vaso-motor influence on speech, 265, 406
- Vauvenargues, 185
- Velpeau, 27, 266
- Verbal amnesia, 224
- delirium, 204
- Vigoroux, 131
- Villard, 214
- Violin, comparison between it and the brain, 357
- Visual centre, on the, 40, 231
- verbal memory, 180

- Vogt C., on the development of the frontal convolutions, 378
 — on the difference between the third frontal convolution in man and in the ape, 381
 Voice, mechanism of the, 160
 — of the gibbon, 378
 Voisin A., on the echo sign, 213
 — on the temperature of the cranium, 284
 Vossius I., on gesture-language, 170
 Vulpian, 33, 322, 330, 368
- Wadham, on a left-handed family, 373
 Waterhouse, on the voice of the gibbon, 378
 Watson Sir T., 55, 207, 212
 Watson H., 131
 Watteville de, on word-blindness and hemianopsia, 236
 Weight of the brains of eminent men, 367
 Welsford, on mirror-writing, 211
 Wernicke, 51, 216, 223
- Whispering, 243
 Whitney, 156
 Wibe, on verbal delirium and paraphasia, 204
 Wiedemeister, 295
 Wigan, 295
 Wilbur, on the aphasia of the idiot, 92, 249
 Wilkinson Sir G., on the skulls of the Egyptian mummies, 391
 Wilks, 76, 194
 Williams C., case of traumatic aphasia, 260
 Willis, 244, 316
 Wills made by speechless testators, 302
 Winslow, 56, 215, 286
 Word-blindness, 182, 225, 310
 — Allen Starr's diagram of, 355
 Word-deafness, 181, 219, 309
- Yellowly, on aphasia from anhydrid in the brain, 253
 Yeo Gerald, on the visual centre, 231





